Telephony

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JOINT USE OF POLES By Telephone and Power Companies

By J. H. PADGET
Manager of Operations, Carolina Power & Light Co.

FROM AN ECONOMIC AND GOODWILL standpoint, the joint use of poles by telephone and electric companies is often feasible. Cheap construction materials being used to erect rural power lines cause the problem of inductive interference for rural telephone companies. Relay system recommended to control power circuit breaker and proper protection for telephone circuit, when poles are jointly used. Address before meeting of North Carolina Independent Telephone Association

THE POWER companies and the telephone companies have one object in view, and that is to render service to their consumers. In doing this it is often necessary for both the power line and the telephone line to be constructed adjacent to each other. Certainly the public needs electric lights and power, and they also need telephones. Therefore, it behooves the public utilities, such as telephone companies and power companies, to get along with one another.

In a number of instances in this country telephone companies were on the ground much earlier than the power companies. Then, due to the industrial development, both high power and low power lines were constructed, in some cases paralleling telephone companies' lines for many miles.

Rights of Both Utilities Established by Courts

I know that before 20 years ago power companies constructed their lines ruthlessly, in such a manner as to disregard the rights of the telephone companies. As you all know, much of our coordination work is based on the early tests and decisions made, to overcome lawsuits brought by one class of companies against the other, so that today there is very little probability of the two classes of public utilities being unable to work together and to decide on a program whereby each agrees to admit the other has certain rights.

Today we get along so well together that even the joint use of poles has been adopted, whereby the telephone company and the power company use the same poles. This was not all brought about by disagreements in the past as to the individual rights of the companies, but it was brought about by the economic engineering study of the entire situation.

Then again the public had something to say about it. It is the public that has to be served, and while they may put up with the construction of a single pole line on a street, in many cases they object to two sets of pole lines on the same street, one on one side for the power company and another on the other side for the telephone company.

Again the question arises as to how far we can go in the joint use of poles. At the present time, this has been limited by certain agreements to 5,000 volts maximum; and it appears to me that, for some reason or other, we are losing a lot of money because telephone companies refuse to allow the joint use of poles up to the maximum voltage of 7,200 volts between phases.

It is the obvious duty of both classes of utilities to serve their customers at the lowest possible cost in order to render service at low rates. . . . We cannot serve rural customers in sparsely-settled territory economically when the telephone company has to build a telephone pole line and the power company a power pole lead. Yet, we are doing this very thing.

Right now, we are proceeding to build hundreds of miles of rural lines. In some of this terriotry there are no telephone lines, but sooner or later the telephone company will have to build a line, as the American people are gradually improving their standard of living to such an extent that the rural customer is now expecting, or is going to expect, all the conveniences of his urban relative.

Then what will happen? It simply means that there will be another pole line on the other side of the highway for the telephone companies, used and owned by the telephone companies.

We all know that it takes a certain size pole to withstand the elements of weather and provide the mechanical strength required to hold up any wires attached to it. It takes a larger pole for the power line than it does for the telephone line, as a rule.

It would not take a much larger pole to accommodate the telephone line and the power line on the same

pole, but here again we come to a problem that, for rural line work at least, has not thoroughly been worked out. The power line, by the use of its larger conductor and for the sake of economy, uses a long span, such as 400 to 600 feet between poles.

Obviously, it is necessary to use as short a pole as possible to overcome the conditions placed upon a power line due to high winds. And, furthermore, if the poles were 5 to 10 feet higher to accommodate a telephone circuit, the size of the telephone wire being much smaller than the size of the power wire, the two could not be sagged at the same tension. Therefore, there would be more sag in the telephone wire than in the power wire and in most instances an intermediate pole would have to be set for the telephone wire.

Even with this construction obstacle there would be some money saved were it not for the difficulties of inductive interference due to the close proximity of the telephone line to the power line, even if the power line were only constructed for voltages up to 7200 volts. The reason for this is not only the close proximity of the telephone line but usually the parallelism of lines involved, which amounts to, in some instances, several miles in length.

Cheap Construction Used In Rural Power Lines

The power companies have embarked upon a program of rural line construction that uses the cheapest methods known, the reason being the low earnings obtained from these rural lines. The power companies have reduced their cost of construction of rural lines by the following methods:

1. Small high strength wire for the conductors.
2. Long spans, reducing the number of poles and insulators.
3. Shorter poles and poles of smaller diameter.
4. Grounded neutral construction with the ground wire grounded at approximately every pole and, in some instances, installed in the same position as the neutral of the secondary circuit and in the same relative position on the pole so that only two more secondary wires are necessary for a three-wire, secondary service.
5. Single phase construction and, as given in (4), only one line insulator per pole is required instead of two.
6. The use of cheaper transformers such as transformers without ratio taps and those having only one primary bushing and the omission of lightning arresters and in their stead the use of spillway gaps for protection against lightning.
7. Crossarms are generally not used in the cheapest method of construction.

Obviously these points have been worked out by power company engineers and not by telephone company engineers. As a result of the cheap construction now used by power companies, there is a hardship placed on the telephone companies whose lines are adjacent to these lines for the following reasons:

1. The use of grounded neutral construction instead of two insulated wires, and the use of 7200 volts to ground instead of 7200 volts between the two insulated wires, greatly increases both the longitudinal and magnetic induction.
2. There are long parallels with telephone lines, sometimes at too close a distance.
3. Residual currents flow through the ground instead of balanced currents in the two insulated wires.
4. There is unsimilarity between the phase wire and ground wire; sometimes as to size, and sometimes as to constituency, and sometimes both.

From these comments you have noted that the cost of power company construction of rural lines has gradually decreased by the use of different methods, but these methods do not permit the best service in telephone lines, due to the fact that both the longitudinal induction and magnetic induction are increased by these cheap methods.

We, therefore, come right down to the final answer as to how or why we should not go to joint pole construction for rural lines. I mentioned before that there would be some saving in the physical construction costs by the joint use of poles provided, however, that inductive interference was not considered. Since it must be considered, due to the fact that a number of rural customers will undoubtedly wish to make long distance calls and they will not be understood at the other end of the line when the joint use of poles is allowed with this cheap construction previously mentioned, how can we change our construction to make the joint use of poles attractive to both companies?

The only thing we can do is to go back to the old way of building rural electric lines—that is, rural lines up to 7200 volts between conductors—and that means:

1. Two line insulators per pole.
2. Two bushings per transformer and more expensive transformers for the reason that either lightning arresters or De-Ion grids must be installed for lightning protection.

Increased Costs Under Joint Pole Use

In my opinion, these increased costs on the part of the power company would about balance the cost of construction of a separate telephone line on the other side of the highway. However, there is not a very great difference between the total cost of either method; that is, if separate lines were constructed, the power company using the cheap method of construction and the telephone line using its usual method of construction with separate pole line, over the joint use of poles with the power company increasing the cost.

Now we come to the operating status of this entire discussion and we find that the power line, whether rural or otherwise, may have trouble due to either lightning or mechanical failure of some sort as well as failure of insulators. Then with the grounded neutral construction of the power line, or the cheap method now used by the power companies, a fault would be cleared within 20 cycles, or say within one-third of a second.

With the more expensive method of construction, provided, the joint use of poles is worked out for rural lines of this voltage, that is 7200 volts, there would be a fault to ground, such as a flashover of an insulator, which might establish an arching ground on this single-phase insulated system. But it would not clear without the use of very delicate and expensive equipment to detect such faults and to differentiate an arcing ground from an unbalanced capacity condition, for example.

Relay System Recommended to Control Circuit Breaker

Now admitting that this discussion has proved the fallacy of being able to go to joint pole use on single-phase grounded neutral systems, due to the large increase in longitudinal and magnetic induction, going to the joint pole use with a standard construction known as the isolated (or insulated) system requires two insulated conductors for the single-phase circuit. As a result, we now get into a hazardous condition should an arcing ground occur on a rural line with a telephone line on the same poles.

These arcing grounds have been known to build up voltages and could build up a voltage of three times normal voltage to ground. In other words, on a balanced single-phase

(*Please turn to page* 38)

IN THE NATION'S CAPITAL

By FRANCIS X. WELCH

Special Washington, D. C., Correspondent for TELEPHONY

SPECIAL INVESTIGATION of telephone industry by Federal Communications Commission now entering its final and general phase. Organization of a rates and research department of the FCC is quietly being made. Comments presented concerning proposed cooperation between Federal and state commissions in working out effective regulation of utilities

THE SPECIAL telephone investigation by the Federal Communications Commission is now entering its final and general phase as predicted by your correspondent in these pages some weeks ago. Following the current recess, hearings will be resumed on or about March 22 at which time a few odds and ends as yet uncovered, such as patents, will probably be developed.

Just how long these final hearings will last is problematical, but it is not likely that they will run through to the end of the formally authorized life of the investigation proper, which is July 1, 1937 (with an additional year for cleaning up reports, exhibits, etc., running to July 1, 1938). The staff is anxious to get down to this rather difficult task of preparing reports for Congress. Indeed, it is understood that the staff hopes to be able to get out one report on the investigation before the current session of the Congress adjourns.

THE STAFF is quietly reorganizing under the general supervision of Telephone Division Chairman Paul A. Walker, but under the more immediate direction of Carl I. Wheat, special counsel. Mr. Wheat wants to make the available funds last long enough to demonstrate the value and necessity of a permanent rates and research department. If it turns out that way, Mr. Wheat, who stands pretty high right now because of his part in arranging the big Bell toll rate reduction last fall, hopes to convince Congress that authority for such a permanent department should be granted.

There seems some doubt among the legal brethren whether the Federal Communications Act in its present form would have to be amended to provide for such a permanent setup. However, that is more or less an academic question, because if Congress is in favor of the idea an amendment will be forthcoming soon enough. The real issue is to sell the idea to the Congressional appropriations committees. If the gentlemen who control the purse strings turn thumbs down, purely statutory authority won't be of much importance.

THE PLAN to set up the new department is also complicated, or at least clouded, by the President's administrative reorganization plan. Not much is heard about this plan. Not much could be heard about that or anything else above the roar and racket the President's judicial reorganization plan has created. However, if you will recall, the Brownlow report suggested the shifting of administrative divisions of all independent commissions to regularly-organized cabinet departments.

Whether a rates and research division would work out if it were taken away so young from its mother commission has created some question. But meanwhile, Mr. Wheat is getting along with his job, with the apparent intention of crossing that particular bridge when he comes to it. For the beginning, it would appear that only a small, closely-knit, but well-qualified division is intended. This would tend to conserve funds and keep the infant out of trouble during its teething days. After all, as Swift once cynically observed, the poor and humble are well protected from unwelcome attention.

Rates and research departments are not unknown among the state commissions, or at least those which have been fortunate enough to wangle appropriations for their existence from the proverbially parsimonious legislatures. Any close students of state commission regulation will readily attest that they have generally proven to be not only well worth their keep during their comparatively short history, but also constitute perhaps the most valuable and promising development in the technique of regulation in the last decade.

Comparisons are odious, as the lawyers say, and besides all of the few state rate and research divisions are doing excellent work. Special mention might be made of the original studies brought out by the Illinois division under the head of Dr. Paul J. Raver (recently promoted) and the statistical studies being published by the rate division of the Washington state commission indicate mature development of this branch on the west coast.

In fact, this matter of rates and research divisions brings up the question that lies at the very heart of Federal-state regulatory relations. Is the Federal government going to swallow up state regulation, or supplement and aid it?

Commissioner Paul A. Walker said over two years ago that he believed Federal regulation of communications would perform its most desirable function in the public interest to the extent that it would cooperate with, and secure cooperation from, the state commissions in working out effective regulation.

IT IS A SERIOUS problem and there are some regulatory officials here in Washington who obviously do not seem to realize how serious and important it is. If one might borrow President Roosevelt's Supreme Court speech analogy about the necessity for the horses on the same team to pull together, it is clear that unless Federal and state commissions do pull together, the regulatory field will not be plowed.

If they go dashing off in different directions or commence jostling each other, there will be wide unfurrowed strips and ugly trenches. Critics will complain of "no man's land" and the "failure of regula-

tion." To get down to cases and name names, it is clear that Federal-state regulatory relations are hardly enhanced by the acrimonious exchange of "open communications," such as has been going on between the chairman of the Federal Power Commission and the chairman of the New York Public Service Commission during the last few weeks.

It may seem like a tempest in a teapot, and probably is, but if any state public service commissioner who followed that correspondence failed to experience some doubt about the probability of understanding cooperation between the state commissions and the Federal Power Commission in the future, he must have been an optimist.

The fuss started when Chairman McNinch of the Federal Power Commission made some remarks before the House appropriations subcommittee about electric rates in New York city being "out of line." It really wasn't so bad if one read the statement as part of the context and appreciated the fact that Mr. McNinch had simply been forced into the defensive by questions from a utility-baiting Congressman.

Under the circumstances when Chairman McNinch received a telegram from Chairman Maltbie of the New York commission asking him in effect just what business that was of the Federal Power Commission, he might have replied apologetically by pointing out this background and explaining the spirit in which the remark was intended. But the Federal official, although pointing out the circumstances, proceeded to challenge the New York commissioner to go on a joint fishing expedition to verify or discredit the accusation.

When the New Yorker declined with some sharpness, the Federal official replied with even more asperity, and that was about the stage of the battle when this correspondent left off watching. Score: 0-0. Result: Hard feelings all around and future "cooperation" between the Federal and New York commission quite unlikely.

NATURALLY, some of the other state commissioners may feel that the Federal official was trying to put the New York commission on the spot with its own state government. Recent associations between Chairman McNinch and two of Chairman Maltbie's severest political critics, Mayor La Guardia of New York City and Chairman Walsh of the New York State Power Authority, has hardly helped to dissolve that impression.

Will state commissions be driven into a defensive coalition against Federal criticism by such incidents? Will the regulatory field with its intricate divisions of intrastate and interstate commerce be effectively plowed by such teamwork? The privately-owned utilities have a definite stake in the effectiveness of regulation. Its collapse or failure may be much worse for private industry.

Fortunately, this correspondent is glad to report that, as presently organized, the temper of the Federal Communications Commission seems entirely different. Commissioner Walker is unquestionably sincere in his desire to effect closer cooperation in regulatory work between the FCC and the state commissions. As a former state commissioner he well knows how the situation is on both sides of the fence.

AND THAT brings us back to the rates and research department that the FCC is trying to develop. Following Commissioner Walker's lead, Mr. Wheat visualizes the formation of a department that will function as a "clearing house" for all branches and types of communications regulation. The idea is not only to help state commissions by furnishing supplemental information when needed, but to make the new regulation less burdensome and expensive for telephone companies.

The ideal, this correspondent was told, is "carbon-copy regulation." Don't confuse this with rubber stamps or yes men—it would be vigorous enough on occasion. But if all the demands for information, all the questions, questionnaires, etc., that the different utility companies are now required to supply for the Federal and state commissions could be made uniform, that would be an approach to this ideal.

Like all ideals, of course, it is a counsel of perfection and it will never be reached practically. State commissions will always want to know something independently from the Federal commission and vice versa. But assuming that by agreement the bulk of the routine reports could be reduced to common forms and to uniform periods of reporting, then the idea of reducing regulation to the carbon-copy stage would be proportionately fulfilled.

Some progress along these lines has already been noted in the states. For a number of years the United States Census Bureau has made up reports on the electric power industry. As the power industry reports were published only at five-year intervals there was quite a gap in the timeliness of this important information. Also, the Census Bureau, being a Federal agency, stressed national rather than state detail.

For the past year, however, the rates and research division of the Washington state commission has been giving out periodical reports which follow exactly the system and classification used by the Census Bureau for power consumption, sales, rates, classes of consumer, etc. Needless to say, if other commissions follow suit we would have available at all times an X-ray picture of the exact status of the electric power industry. We could truly compare one state with another. We would have our common denominators already worked out for us.

The Illinois rates and research division also gets out substantially the same information but in a different form. It is not comparable without some mathematical treatment that injects questions and doubts as to the results of such comparison.

WHETHER the Federal Communications Commission is planning exactly that type of "clearing out" reporting is not known — perhaps not even decided. But the opportunity is really there to function as a clearing house for furnishing, not only to the state commissions but to anyone interested, all pertinent information about the telephone industry.

As for the industry itself, such thorough statistical coverage may involve some sacrifice of time, expense, and trouble, but it might well result in protection against suspicion and continual investigation. After all, nobody has ever had to wonder much about the private life of a gold fish.

A subcommittee has been named by the House interstate and foreign commerce committee to hold hearings on the bill introduced by Representative Clarence Lea (D.), of California, which would give the FCC authority to allow, under regulation, the "franking" of telephone and telegraph service for our public servants and others. The bill is understood to be designed to regulate and avoid abuses of the free communications privileges.

The subcommittee is headed by Representative Pettengill (D.), of Indiana, and is made up in general of three Democrats, two Republicans and a Wisconsin Progressive.

Mathematics For Telephone Engineers

By H. H. HARRISON

SEVENTH ARTICLE, PART IV, takes up the process by which successive differential coefficients of a primitive function may be found. This series, begun May 30, 1936, was especially prepared for telephone engineers who handle alternating current problems

SUCCESSIVE DIFFERENTIATION: Successive differentiation is the process by which successive differential coefficients of a primitive function may be found. If $y = df(x)/dx$, this may, itself, be differentiated. Thus $\frac{d(dy/dx)}{dx}$ represents the process of obtaining the second differential coefficient and is usually written d^2y/dx^2.

This is merely a symbolic method of writing the instruction to differentiate a second time and does not mean $(dy)^2/(dx)^2$. A third differentiation would be written d^3y/dx^3 and so on.

Example:

$$y = x^4 + x^3 + 1$$
$$dy/dx = 4x^3 + 3x^2$$
$$d^2y/dx^2 = 12x^2 + 6x$$
$$d^3y/dx^3 = 24x + 6$$
$$d^4y/dx^4 = 48x$$
$$d^5y/dx^5 = 48$$

If the original function is $f(x)$, the first derived or differential is written $f'(x)$, the second, $f''x$, the third $f'''x$ and so on. Roman numerals replace the accents when these exceed three, thus, $f^{iv}x$. Sometimes $\phi'x$, $\phi''x$ are employed for designation purposes.

If $y = f(x) = x^n$

$f'x = nx^{n-1}$

$f''x = n(n-1)x^{n-2}$

$f'''x = n(n-1)(n-2)x^{n-3}$

It is frequently necessary to determine the second or even the third rate of change of a function; and one of the best examples is the derivation of the velocity and acceleration from the space-time or displacement curve of a moving body.

In Fig. 82 (a) is the curve showing the displacement of a moving body with time, such as the movement of a railroad train from rest. Now velocity = space/time, and the instantaneous velocity at successive intervals of time will be given by $v = ds/dt$, which is curve (b) of the Fig. 82.

The acceleration is the number of units of velocity added in a given time or v/t and its instantaneous value is dv/dt or $d(ds/dt) = d^2s/dt^2$, curve (c) of Fig. 82.

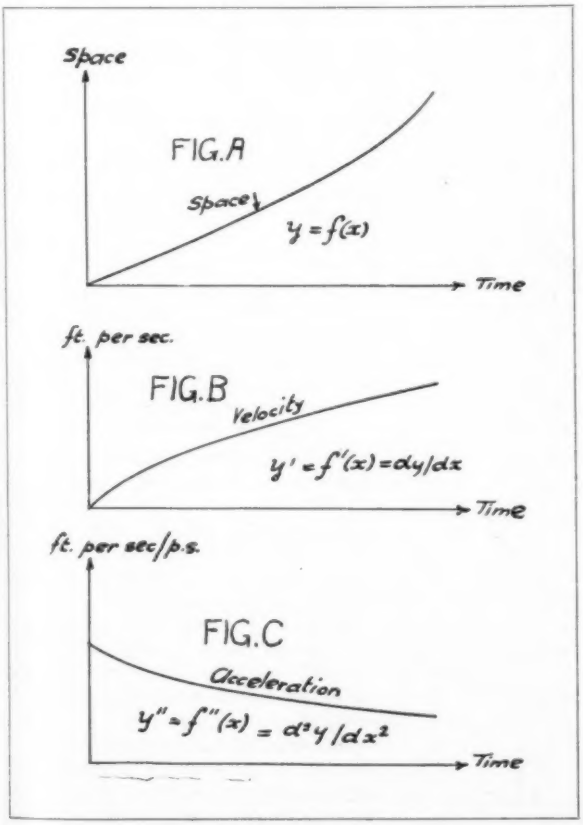


Fig. 82. Displacement, Velocity and Acceleration Curves of a Moving Body.

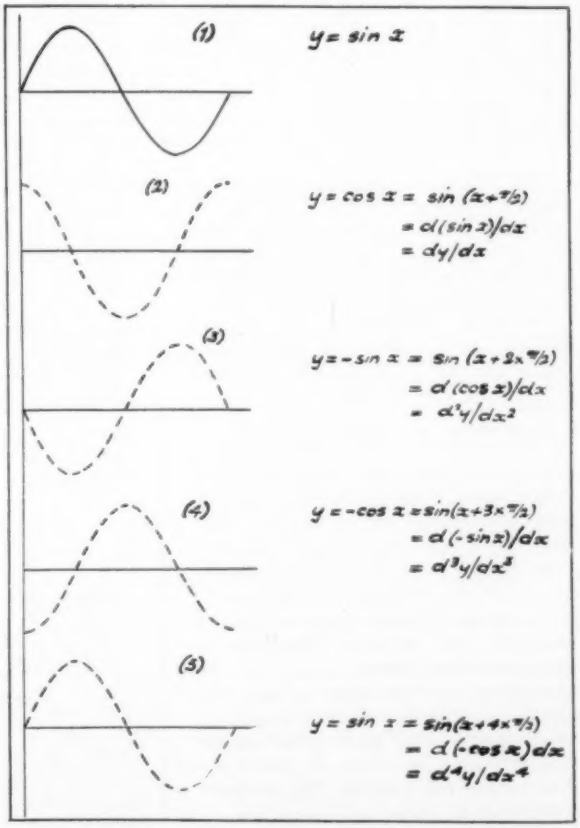


Fig. 83. Illustration of Successive Differentiation of Sine and Cosine Functions.

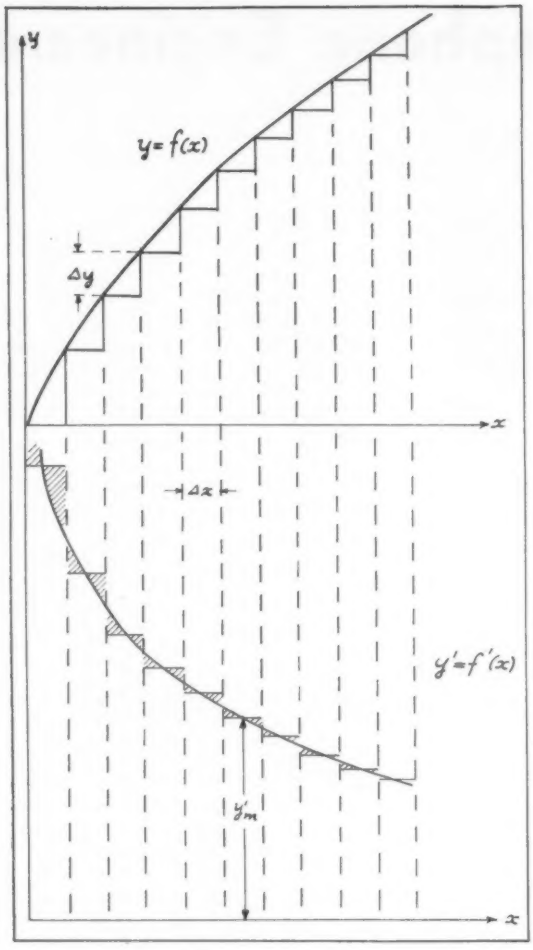


Fig. 84. Holzer's Method of Graphical Differentiation.

Fig. 83 shows the successive differentiation of sin x, from which it will be noted that after differentiating twice the sine curve is reproduced with its sign, however, reversed, while after the fourth differentiation the original curve is repeated. This would also be true if the cosine curve had been taken. Sin x and cos x are the only functions which yield this peculiar result.

GRAPHICAL DIFFERENTIATION: It is often necessary to differentiate once or several times a graphically-given set of magnitudes representing some experimentally-obtained set of results. Several methods of carrying out this process are known and, as they are instructive, they are worth describing here.

Fig. 84 shows the principle of Holzer's method. The ordinate differences of the primitive curve $y = f(x)$ are plotted on a larger scale on the same bases $\triangle x$. The derived curve $y' = f'(x)$ is obtained by drawing this through the mid points of the strips $\triangle x$ which are the points representing the ordinate differences of $f(x)$.

Holzer's method depends upon the fact that the ordinate of a curve $f(x)$ is the differential coefficient of its area. Referring to Fig. 85-A, if OMPp is the area of the shaded portion of the curve, then

$$\text{area OMQq} = A + \triangle A \text{ and}$$
$$\triangle A = \text{PpQq}.$$

If $\triangle x$ is indefinitely small, PQ is sensibly a straight line and

$$\triangle A = \tfrac{1}{2}(Pp + Qq) \times \triangle x$$
$$= \tfrac{1}{2}(y + y + \triangle y) \times \triangle x$$
$$= (y + \tfrac{1}{2}\triangle y)\triangle x$$

As $\triangle y$ becomes infinitesimal, $dA/dx = y$, or the ordinate of the curve at any point, is the differential coefficient of its area at that point.

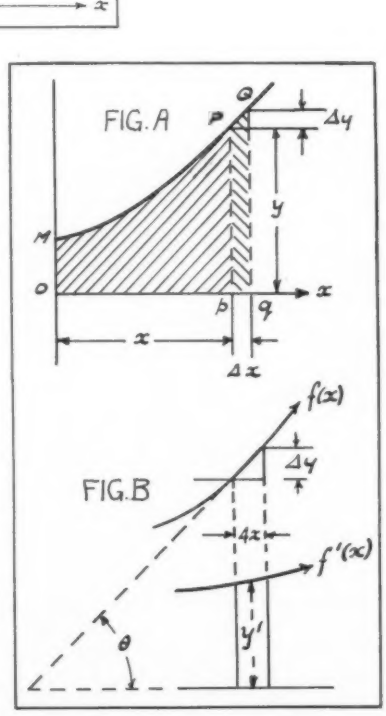
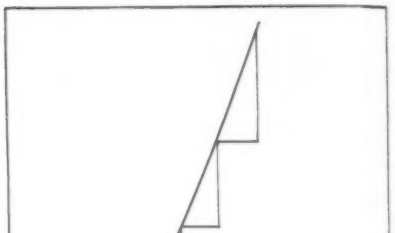


Fig. 85. Theory of Holzer's Method of Graphical Differentiation.



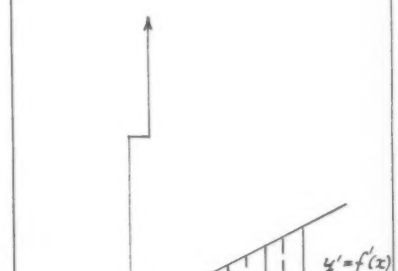


Fig. 86. Reverse Differentiation. Obtaining the Primitive from the Derived Curve (Integration).

Referring to Fig. 85-B, let $y' = \triangle y/\triangle x$, but y' is also $= \triangle A/\triangle x$ of the lower curve $f'(x)$. Therefore, $y' \cdot \triangle x = \triangle A$ and $y' \cdot \triangle x = \triangle y$ or $\triangle A = \triangle y$; that is, the number of square units in the strip $y' \triangle x =$ the number of linear units in $\triangle y$.

That the ordinate of the curve $y = f(x)$ at any point is equal to the area of the lower curve $f'(x)$ will be seen to be true from the following considerations:

The area of an elementary strip of the derived curve is the product of the ordinate difference of the upper curve to some chosen scale, multiplied by $\triangle x$. The number of such strips is evidently $x/\triangle x =$ say, n. The total area of the

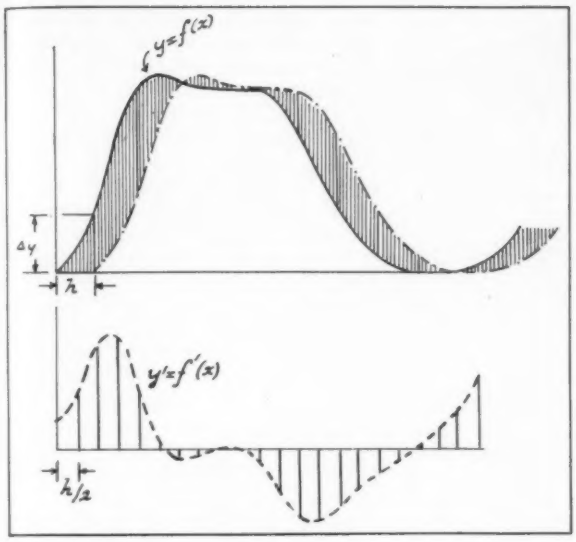


Fig. 87. Slaby's Method of Graphical Differentiation.

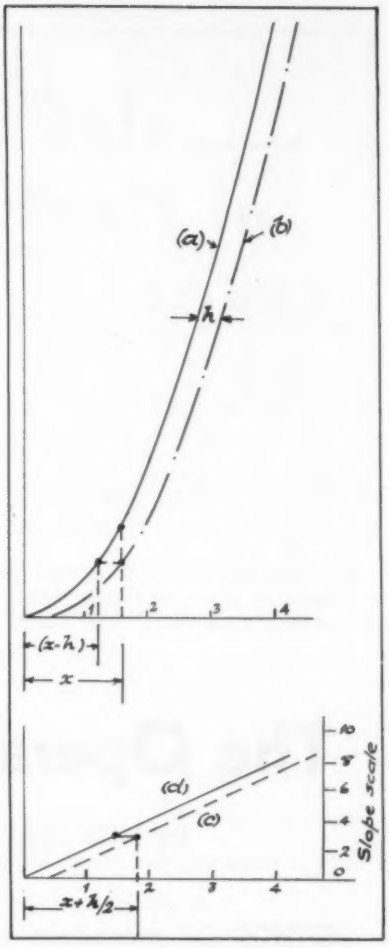


Fig. 88. Theory of Slaby's Method of Graphical Differentiation.

lower curve up to x is, therefore, $n \times (\triangle y_1 + \triangle y_2 + \ldots)$. The quantity in brackets sums up to the ordinate of the upper curve at point x.

Given the derived curve y', reversing the process will give the primitive curve y. Fig. 86 shows this where the derived curve $y' = 2x$. The procedure will be obvious. This reversed process whereby the primitive function is obtained is known as *integration*.

Slaby's method of graphical differentiation is explained by Fig. 87. The original curve, $y = f(x)$, is plotted a second time on the same base but displaced by a small amount h. The ordinate differences $\triangle y$ are set up in the lower part of the diagram but displaced backwards by an amount, $h/2$, and the lower curve, $y = f'(x)$, results.

The theory of this method can best be explained by taking a known function and graphically differentiating it. Referring to Fig. 88, the equation to curve (a) at point x is $y = x^2$ and the equation to the curve (b) at the same point is $y' = (x - h)^2 = x^2 - h^2 - 2xh$. The difference between the ordinates of the two curves is $x^2 - x^2 - h^2 + 2xh = 2xh - h^2$, which is the equation to curve (c). Curve (d) is curve (c) shifted backwards a distance $h/2$. Its equation is, therefore,

$$y = 2(x + h/2) - h^2 = 2xh \text{ or}$$
$$y/h = 2x$$

Writing $Y = y/h$, $Y = 2x$

The ordinates of curve (d) are those of the slope curve of $y = x^2$ to a certain scale which is easily determined. Thus when $x = 3$, $2x$, the ordinate of the slope curve is 6. Mark this on the slope scale and then sub-divide this scale suitably.

A third method is shown in Fig. 89. The primitive curve is, in this case, $y = \cos x$ and is divided into strips, not necessarily equal in width, being narrower where the curve is varying rapidly and wider where it is flat. The horizontal axis, Ox, is extended to the left to p. From p a line is drawn at an angle equal to the angle of slope of the top of strip 1. Where line p1 cuts the vertical, a horizontal line is drawn cutting a vertical line from the middle of strip 1. The intersection of these two lines constitutes a point on the derived curve. The curve chosen in this instance being symmetrical, one radial line, such as p1, gives two points on the derived curve. The theory on which the method is based is as follows:

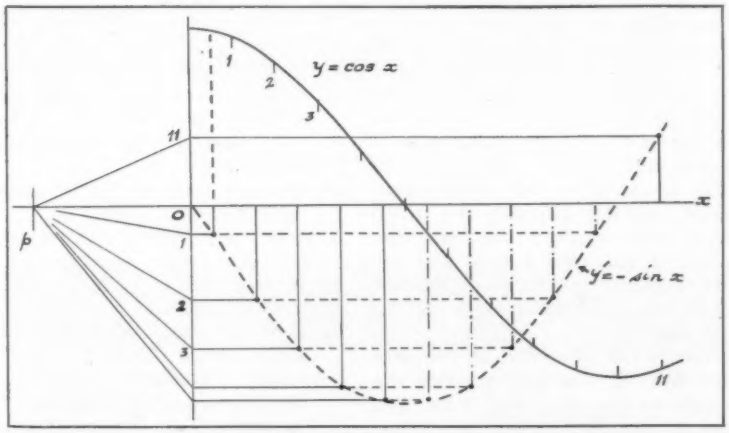


Fig. 89. Graphical Differentiation of $y = \cos x$.

Referring to Fig. 90, it is evident that triangle pOA is similar to triangle acb, since all the sides are parallel. Angle θ is equal to angle bac. Therefore, the slope of curve ab at its mid point $m = bc/ac = OA/Op = c'd/Op$. Therefore, cd = slope of curve at m multiplied by Op.

If the vertical scale of the primitive function is divided by p to furnish a scale for $f'(x)$, the ordinate c'd, to the new scale, is the slope of the curve at m. (Op has increased the ordinates of the slope curve in the ratio of Op/ac and hence the necessity for this division.) Thus, if Op is of such a length

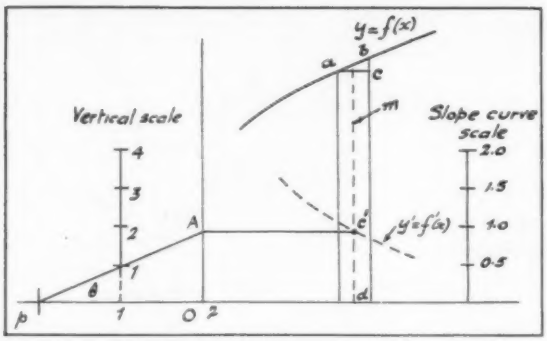


Fig. 90. Graphical Differentiation. Theory of Method of Fig. 86.

that OA is twice the length unity on the vertical scale of $y = f(x)$, it is clear that all ordinates such as c'd will be multiplied by 2. To correct for this the scale of $y = f(x)$ must be divided by the same figure in order that the derived curve accurately represents $d\ f(x)/dx$.

This method requires some care in draftmanship to secure accurate results. Where the original curve varies rapidly, the strips should be very narrow, and the protractor employed must be carefully set to get the true angle of slope with small, elementary widths of strip.

These graphical methods are highly educational and make the differential coefficient a very real thing, and the student who uses them to prove some of the previous results will learn quite a lot.

(To be continued)

The Operators' Corner

By MRS. MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

METHOD OF procedure for handling public station calls. Series No. 279

COLLECTING COINS in payment of long distance calls is an important duty of the average toll operator. She is responsible for collecting the correct amount of a report charge, an initial period charge and an overtime period charge. She is also responsible for notifying the customer when the initial talking period has expired.

A call originating at a station for the use of the public is termed a "public station" call. There are three types of public stations:

(a) PREPAYMENT COIN STATION: This is one in which a coin is deposited in order to call the operator. Coins can be collected by an operator or returned by her to the customer.

(b) POSTPAYMENT COIN STATION: One in which all deposits are made after the operator has been reached. Coins cannot be returned to a customer from this type of instrument.

(c) ATTENDED PUBLIC SERVICE STATION: One at which there is an attendant whose duty it is to place calls for customers, receive reports from operators, and make collections.

It is essential that the toll operator ascertain the rate to the called place at the first opportunity on calls originating at these stations and, having ascertained it, to enter it on the back of the ticket in the lower right-hand corner. This enables the operator to compute the charge without delay.

It is also important that the toll operator take the necessary action to determine when the initial period has expired. As soon as the starting time has been stamped on the ticket, enter on the back as near as possible to the corner which will be upward and nearest you when the ticket is placed in the spiral ticket holder, the time at which the stated period will expire; for example, "3-27," if you cannot read the seconds on the clock dial, or "3-27-40," if you can read the seconds on the clock dial.

Observe the time entry at frequent intervals. If you cannot read the seconds on the clock dial, when you observe that the stated period has nearly expired, stamp off the ticket very lightly at short intervals, as an aid in determining its expiration. After stamping off the ticket, draw a wavy line through each trial arrow so that none will be confused with the final stamp. If you can read the seconds on the clock dial, observe when the stated period has expired.

In securing the deposit of charge for the initial period on a call from a coin station, give the report of "Ready" on every call when both parties are on the line ready to start conversation and add, for example: "Thirty-five cents for 3 minutes." When the correct amount has been deposited, say, "Thank you" and start conversation if necessary.

After requesting a deposit, listen for the coin signals and enter the denomination of each coin as it is deposited. Arrange the entries in a vertical column on the back of the ticket as near the upper right-hand corner as possible. After the correct amount has been deposited for a report charge, an initial period, or for an overtime period, draw a line under the last coin entry.

In answer to question No. 4, if a proper coin is not deposited and the call originates at a prepayment coin station, say, for example: "I am sorry, I do not get the signal. I will return your money." Return the deposit, then say, "Deposit (amount) again, please." If you still do not receive the correct signal, say, "I will return your money again. Will you deposit the same amount in another coin, please?" If you still do not receive the correct signal, connect the calling party with your supervisor.

If the proper coin is not deposited on a call originating at a postpay coin station, connect the calling party with your supervisor.

In next week's series of questions we will outline the supervisor's responsibility in connection with securing the correct deposit of a coin or coins.

Questions from Illinois Operators

1. Does it seem right to hold a subscriber's line for a long distance call when a local subscriber is calling the same party?
2. When is the code "WH" entered on an OUT toll ticket?
3. What is a remote control operator?
4. When a proper coin is not deposited, how can it be verified?
5. Is it essential that a chief operator's record include an "address record" in addition to alphabetical and numerical references?

The answers to these traffic questions may be found on page 30.

Monophone Quality ... reveals itself in longer life

The above illustration shows the Type 35A5 Wall Mounting Monophone. This, as well as its companion piece, the Type 34A3 desk model, can be furnished for either manual or automatic operation, and also in a variety of art shades with chromium or gold-plated trim.

EVEN at first glance, the rich molded lines of the new self-contained Monophones indicate their inherent high quality.

Yet it is only after long service that the true worth of Monophone craftsmanship is completely revealed. Freedom from breakage, permanence of adjustment, continued high efficiency performance, lasting lustre of finish—all these are typical Monophone qualities, which mean both longer service life and lower cost per year of service.

Begin to standardize on Monophones now—and reap the reward in lower operating costs in the years to come.

AUTOMATIC ELECTRIC

TELEPHONE, COMMUNICATION AND SIGNALING PRODUCTS

Distributed by:
AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 West Van Buren Street, Chicago
Export Distributors: AUTOMATIC ELECTRIC SALES CO., LTD., Chicago

Builders and Destroyers Of Customer Good Will

DISCUSSIONS on the important subject of customer good will from diverse viewpoints as presented at traffic conference in conjunction with the convention of the Iowa association

The Builders of Customer Good Will

By MARGARET RUSTAN
Iowa State Telephone Co.,
New Hampton, Iowa.

WHAT IS customer good will? In telephone language, it is a satisfied subscriber, yesterday, today and tomorrow.

Facts should always be faced. Customer good will is lacking in numerous exchanges today. It has been lost in many instances by the pressure of events of the last few years—forcing exchanges to operate with a reduced subscribers' list, which, in turn, reduced operating schedules and caused curtailment of plant replacements—and by the personal worries of our customer public through this same period, occurred through no fault of the telephone companies or its customers, but leaving both with a job of real reconstruction to do.

Now is the time to set our exchanges and staffs in order, for our part in this job of reconstruction, and bring back customer good will to the credit side of our ledgers. We must recognize this is truly as vital to our industry's well-being as rebuilding depleted subscribers' lists and debilitated plants.

In "telephonese" we have three inseparable units of communication—plant, traffic and commercial—to make the completed whole. Each in its own phase is equally important and is equally dependent upon and responsible to the whole for the finished product of telephonic communication furnished to the customer.

In the past sales and public relations were regarded as almost wholly the responsibility of the commercial department. We think differently today. Operators and plant men are turning in sales quotas as part of their routine and are doing a very good job in many instances. As with sales, the cooperation of traffic and plant as well as commercial people is necessary in building and maintaining customer good will.

We compare quite favorably with other businesses in our localities in financial standing and are a necessity to the community's well-being. Accordingly we should make our place of business as attractive as our means will permit. It is not necessary to spend a lot of money to do this. It is necessary, however, to spend a lot of time and thought and work on it.

Look over your exchange home with the eyes of a customer and improve it. A clean, well-aired building—with tasteful curtains of inexpensive material, possibly one or two pleasing pictures, with no useless furniture, but with that in use clean and nicely painted or varnished—with neat grounds, will prove an asset to your town and a place where people will like to come.

The traffic or the operating staff has it within its power to achieve the results we desire by a thorough analysis of the service now being rendered. Speed up the answering of all signals in your exchange, local and toll, with special emphasis, if needed, on rural. At least 90 per cent of service complaints are under this heading.

"Error, thy name is legion," can be changed to "Eliminated, waste of time," by reducing wrong numbers to the minimum (watch those line numbers closely); correct code ringing, straight, selective or rural (watch those keys and that spacing) concentrating on the called number on the first reception. Close checking is also needed of charged numbers on toll ticket recording. All irrelevant conversations while at switchboard should be stopped, as a mind and tongue divided are not and never can be free from error; nor can they render efficient and speedy service.

Above all, show interest in your work; get it in your voice; leave all sense of irritation at home.

In turn, the plant men can do a great deal for customer good will by being attentive and courteous and considerate when on the subscriber's premises. Removing rubbers at the door, standing on a small canvas while working in order to catch all debris, and carefully disposing of it, at the same time exercising care not to mar woodwork or walls, concealing all wiring where possible and placing the instrument at the correct height for the subscriber, will win the feminine subscriber as well.

The plant man should be alert to pick up all service complaints and report them to the chief operator or the commercial office for further handling, assuring the subscriber they will be taken care of. He should be loyal to the traffic department and not mention a possible shortage of operating schedule.

The commercial office probably bears the heaviest load in this matter. It is the clearing house of most service complaints, regardless of their origin. Tactful handling of all complaints is essential.

Efficient handling is absolutely necessary. Do not stutter when you begin to look into this request of your subscriber. Know your job, from all angles. Show the subscriber that his interests and yours are the same, that he wants good service in all departments, that you want him to have good service from all departments.

Study ways of serving your community's communication needs. You can do a surprising number of things without extra cost to your company and the community will like it. Explain our work at every opportunity, a great many subscribers will be interested in knowing how and why we do certain things. In fact, the subscriber is a human being, even as you and I. Give him the best you have and his good will is yours.

▼ ▼

The Destroyer of Public Good Will

By MRS. KATE M. THAYER
Chief Operator,
Iowa State Telephone Co.,
New Hampton, Iowa.

PUBLIC GOOD WILL of telephone customers has been dealt serious blows through the past several years, due to reduced operating schedules and personal worries making subscribers as well as operators irritable and fault-finding. We have permitted a large number of items—small when taken by themselves but formidable as a whole—

SPANNING the NATION
WITH A FAST TELEPHONE SUPPLY SERVICE

WITH our four large, completely-stocked warehouses located at strategic points throughout the United States, we can provide extra-fast telephone supply service to any exchange in the country. Mail or telephone your order to our nearest warehouse. In either case your shipment will be on the way within a few hours after we get your instructions.

Furthermore, everything you order from us, down to the smallest, seemingly unimportant item, will be: 1st—a high quality product of standard manufacture; 2nd—"checked and double-checked" by experienced telephone men to assure that what you get is what you ordered; and 3rd—packed and shipped with unusual care to insure its arriving in perfect condition. May we hear from you?

SAN FRANCISCO:	KANSAS CITY:	CHICAGO:	RICHMOND:
235 Montgomery St.	2025 Main St.	1033 W. Van Buren St.	314 N. 18th St.
(Ph. Garfield 2465)	(Ph. Harrison 4720)	(Ph. Haymarket 4300)	(Ph. 2-5440)

AMERICAN AUTOMATIC ELECTRIC SALES COMPANY
1033 WEST VAN BUREN STREET **CHICAGO**

Distributor for Products of: AUTOMATIC ELECTRIC COMPANY, and other companies

to creep into traffic and destroy public good will. Shall we take them one by one and see if we recognize them?

Near the top of this list we find "tone of voice." So much depends on courteous treatment of our public and giving our subscribers good service that just one sentence spoken in a sharp or irritable manner will undo hours and sometimes days of good service previously given. This reflects not alone on the operating force but on the company as well.

Another destroyer of good will is the failure to keep in mind that when a connection is established and the called telephone has been rung it is our duty to follow up a slow answer with supplementary ringing and to cut in on the connection, advising the waiting customer as to what we are trying to do to complete his call. We may ring several times, but if the calling party doesn't know it, he is going away from the telephone with the feeling that we have given him poor service. There is always the thought that "if that operator would just ring again they probably would answer."

Much time and expense have been given by the telephone company in working out a satisfactory ringing system. Carelessness on an operator's part in ringing the correct color or letter aggravates customers and causes needless delay.

Code ringing without proper spacing between rings, or rings too long or too short, causes confusion to the subscribers on the line and often much valuable time is wasted on the subscriber's part in answering the wrong ring. It also happens that the right party loses calls in this way.

A report from a subscriber to his local operator is important to him and cannot be handled successfully by a display of indifference. His esteem for the company is lowered and this is another case where the manager or supervisor must spend time and effort to bring satisfaction.

We made a purchase in a local store the other day where the clerk was told by the manager not to wrap the package. The article purchased was enclosed in a carton which was labeled and was also conspicuous by its color. The clerk tried to be gracious and we tucked the package under our arm and walked out, thinking the saving in not wrapping the carton very trifling to risk the loss of a customer.

Do we realize how things that appear so trifling to us are so real to our customers?

A customer driving through stops to place a toll call to a distant city, thinking that he can have a business matter taken care of and be on his way again in a few minutes, and waits 10 minutes. Then, being in a hurry to push on, he asks the toll operator what has become of his call. She gives a report of a busy circuit. He waits a few minutes longer, then requests that the call be cancelled as he can send a telegram instead and be on his way.

Are we sure that numbers of our cancelled calls might not be saved and toll sales increased if we would keep always on the alert to see that all due reports are promptly given?

Losses at pay stations sometimes occur because the toll center operator is slow in ringing back on the circuit to advise the tributary operator of overtime and the customer has gone out before he has been told he has overtime.

Operators' schedules are worked out by those in charge with the best interests of everyone taken into consideration. Shortening her schedule by tardiness or unnecessary absence from duty throws the day's schedule out of balance, causing someone else to work overtime when perhaps she may have important appointments which must be cancelled or on which she is required to make apologies for tardiness. An operator who makes a practice of being tardy is not so happy in her work and often fails to do the best work of which she is capable.

The injurious effect resulting from an unfriendly attitude toward a new operator who is striving to work her way through uncertain conditions and from neglecting our duty in offering to help is two-fold, both of which are important to the growth and stability of the company: (1) Valuable circuit time is wasted by the slowing up of service, oftimes causing the customer to become disgruntled. (2) We are killing the spirit of cooperation among ourselves.

Often someone enters the building after business hours, not realizing just how late it is or, perhaps, thinking the office manager may have been delayed for some purpose and the office may still be open. Desiring some special information and finding the office closed, the late comer tries to obtain this information from other representatives of the company. Or it may happen on the street on our way home, or in a store where we have stopped for a bit of shopping. Replying to these inquiries in an indifferent manner loses opportunities for conveying to customers the good will of the company and its desire to be of service.

If at any time, under any circumstances we fail in conveying to the public—through our actions or manner of speaking—that we stand back of our company and our fellow employes, or that we are willing and anxious to confer with them on any matter of trouble or annoyance which the customer may be experiencing, we have broken our faith and are standing in a fair way of losing our chances of being an asset to our company.

COMING CONVENTIONS

Texas Telephone Association, Baker Hotel, Dallas, March 16, 17 and 18.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, March 23 and 24.

Iowa Independent Telephone Association, Hotel Fort Des Moines, Des Moines, April 6, 7 and 8.

Wisconsin Locally Owned Telephone Group, Park Hotel, Madison, April 13.

Wisconsin State Telephone Association, Park Hotel, Madison, April 13, 14 and 15.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 21 and 22.

Kansas Telephone Association, Municipal Auditorium, Junction City, May 5 and 6.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

Pennsylvania State Telephone & Traffic Association, Penn-Harris Hotel, Harrisburg, May 20, 21 and 22.

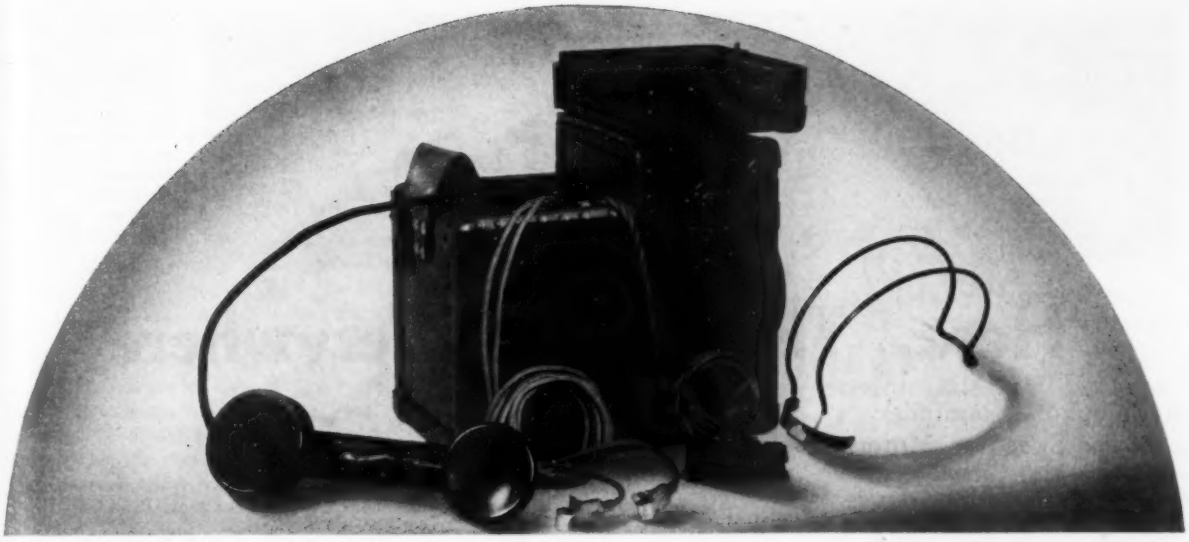
Missouri Telephone Association, Muehlebach Hotel, Kansas City, May 25 and 26.

New York State Telephone Association, Rochester, June 1 and 2.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 22 and 23.

Recent Prices in the Metal Markets

New York, N. Y., March 8: Copper—Firm; electrolytic spot and future, 16.25c per lb.; export, 16.75c. Tin—Strong; spot and nearby, 60.00@60.10c per lb.; future, 9.80@90c. Lead—Strong; spot New York, 7.25@7.30c per lb.; East St. Louis, 7.10c. Zinc—Strong; East St. Louis spot and future, 7.50c per lb. Iron—Steady; No. 2, f.o.b. Eastern Pennsylvania, $25 per ton; Buffalo, $24; Alabama, $18. Aluminum—20@21c per lb. Antimony—Spot, 16.75c per lb. Quick-Silver—$93@95 per flask of 76 lbs. Platinum—$58 per oz. Wolframite—18.50@19c per lb.



The West Test Set, shown with cover open ready for operation.

Adopt This "Relief Program" for Your 1937 Line Troubles!

The West Test Set, with cover closed. Price—aluminum-covered wood case — $40.00. Leather case—$42.50.

The West Test Set offers complete relief for your most difficult and bothersome line troubles. No more opening important, heavy-traffic lines to locate grounds or crosses; no more time and effort wasted determining where opens have occurred; no more necessity for two linemen to work together to find where an equipment failure has taken place.

The West Test Set ends all this by providing a quick, scientific "short cut" for the lineman. Working by himself, he can rapidly locate shorts, opens, grounds, crosses, "high" joints, poor ground rods, swinging contacts, as well as trouble in house wiring, lightning arresters, coils, etc. No "inside" man is required.

Every telephone company, large and small, should provide its field men with this modern means of detecting and locating trouble. Send for literature describing this scientific, portable test set in full detail.

Prices subject to change without notice.

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Preliminary Sketch of Three Signboards, 50 by 12 Ft., to Be Placed in Advantageous Highway Locations in New Haven, Milford and Hartford, Conn., by the Southern New England Telephone Co.

Here, There and Everywhere

A Telephone Reminder for Speeding Motorists

On this page is reproduced a preliminary drawing of a huge sign to be posted by the Southern New England Telephone Co. in three advantageous highway locations in Connecticut. The finished signs will measure 50 feet in length and 12 feet in height. They will be illuminated at night until 12 o'clock.

The speediest motorist should be able to read and comprehend the clear and concise message to "Telephone Ahead and Make Sure," or "Telephone Back and Reassure." Many motorists already appreciate the value of long distance. To them the sign serves as a reminder.

To others who have not developed the long distance habit, the sign suggests, in the fewest possible words, that to avoid disappointment when arriving at one's destination, telephone ahead; also that it is a good plan to telephone back to reassure those left behind that you have arrived safely at your destination.

One of these signs will be erected atop the store at the corner of Admiral street and Orange avenue in Allingtown; another will be placed on the Milford cutoff where it will be seen by motorists approaching New Haven; and the third will be located in East Hartford just before one gets to the East Hartford Bridge so that it will be seen by those driving from East Hartford to Hartford.

Statistics show that each day more than 47,000 persons in automobiles pass the first location mentioned; 42,000 pass the second location; and 51,000 pass the East Hartford point. It is well known, too, that there is a tremendous amount of motor traffic through Connecticut—the Gateway of New England—and the outdoor signboard is believed a most satisfactory method of getting a message across to these thousands of motorists.

▼ ▼

Telephone No Inspiration For Poem in Netherlands

C. A. Swoyer, 1497 S. 4th street, Columbus, Ohio, known by his friends as "Doc," has been cooperating with other hobbyists in various parts of the world. Recently, as related in The Ohio Bell, the company's employe's magazine, he received a letter from Karel Stoel, Utrecht, Netherlands, offering to exchange automobile license plates, "Doc" Swoyer having made it known that he has a complete set of Ohio plates.

Mr. Swoyer, who is in the plant department of the Ohio Bell company, is also much interested in collecting poems concerning the telephone and asked Mr. Stoel if he had ever run across any. His reply was as follows:

"Good heavens, I never met with a poem on the telephone, but if I once do I'll remember you. Why make poems on the telephone? Of the telephone I can only say it is terribly expensive here, sometimes in disorder and gives sometimes a lot of trouble. Perhaps if it were popular, there should be somebody who likes to make a poem on it, but now it is far from that."

—Swift News Photo

Palestine, Believed to be the Oldest Country in the World Having Been Inhabited Some 7,000 Years Ago, Has Developed a Re-Birth in the Last Two Decades. Its Population Is Reported to Have Increased More Than That of Any Other Country and the New Inhabitants Have Built One of the Most Modern Countries Along the Mediterranean Sea. The Picture Shows a View of the Famous Jaffa Gate With Two Arab Sheiks in Ancient Costume Walking Through the Gate While a Modern Telephone Booth, Located on the Right, Represents Twentieth Century Up-to-Dateness.

▼ ▼

Some Paragraphs From My Daybook

By The Salesmanager

Johnson once said: "Self confidence is the first requisite to great undertakings."....Johnson wrote that little sentence years ago but it is still applicable to all of our present-day undertakings. Especially is it adaptable to selling products to Mr. and Mrs. America. The man who is afraid to sell should not tackle his prospects until he has first conquered himself.

●

If a telephone company employe walks into a busy office and notices that the office has only one or two telephones and that they are always busy, the employe can rest assured that the company is losing much business because the telephone lines are always busy. Additional lines, a wiring plan with additional telephones, or a P.B.X. should be suggested to the management of the company. Additional service will bring the company much business it is now losing because of "busy signals."

●

An interesting sales story can be created by building up a story around the habits of the hardworking hen. Hard work means nothing to the hen. She just keeps on digging worms and laying eggs regardless of what the business forecasters say about the outlook. When the ground is hard, she scratches harder. If it's dry, she digs deeper. If she strikes a rock, she works around it. If she gets a few more hours of daylight, she gives us a few more eggs. No one has ever seen a pessimistic hen. A hen never starved to death waiting for worms to dig themselves to the surface. A hen never cackles because of the

work. A hen saves her breath for digging and her cackling for eggs. There's many a good lesson for salesmen in the habits of the little hen.

●

In looking over a copy of a new telephone directory it appears that some salesmen have failed to realize that "Classified Directory Service" includes many types of listings. More emphasis should be put on the subjects of light face listings, bold face listings, extra lines, information listings, trade mark headings and listings. Each type of listing has a different rate; and to make any directory show a favorable profit, all types of listings should be thoroughly explained to the prospect.

▼ ▼

No Wrong Telephone Numbers on Huge Air Liner

The shortest telephone connection, on which there can be no busy signals or wrong numbers, is among the features that make up the latest word in air transportation found in United Air Lines' new 1937 type, $3,000,000 fleet of de luxe Skylounge Mainliners recently placed in non-stop service between Chicago and New York and shortly to be flown from coast-to-coast. A miniature telephone system has been installed between the pilots' cockpit, in the nose of the giant three-mile-a-minute transport,

Telephone in Stewardess' Pantry on New Skylounge Mainliners Connect with the Pilots' Compartment, a Distance of 30 Feet. Stewardess Hazel French is Shown Giving a Message to the Pilot Over This Miniature Telephone System.

and the stewardess' compartment, a distance of 30 feet.

The door connecting the pilots' cockpit and the passenger cabin is closed while the silver, 12-ton ship is in flight. The stewardess keeps in touch with the pilots by telephone, as shown in one of the illustrations. She may want to know if she has time to serve a hot meal to her passengers. Or if some of the passengers are playing one of the games to be found aboard these Mainliners or perhaps a hand of bridge, they may want to know if they have time to finish before the ship lands. The stewardess telephones the pilots to advise how many passengers want cab transportation at the destination, which information is radioed to the airport.

A handset or French-type telephone is installed on each end of the small telephone system and the party on either end is signaled by pressing a button which rings a buzzer and flashes a light.

▼ ▼

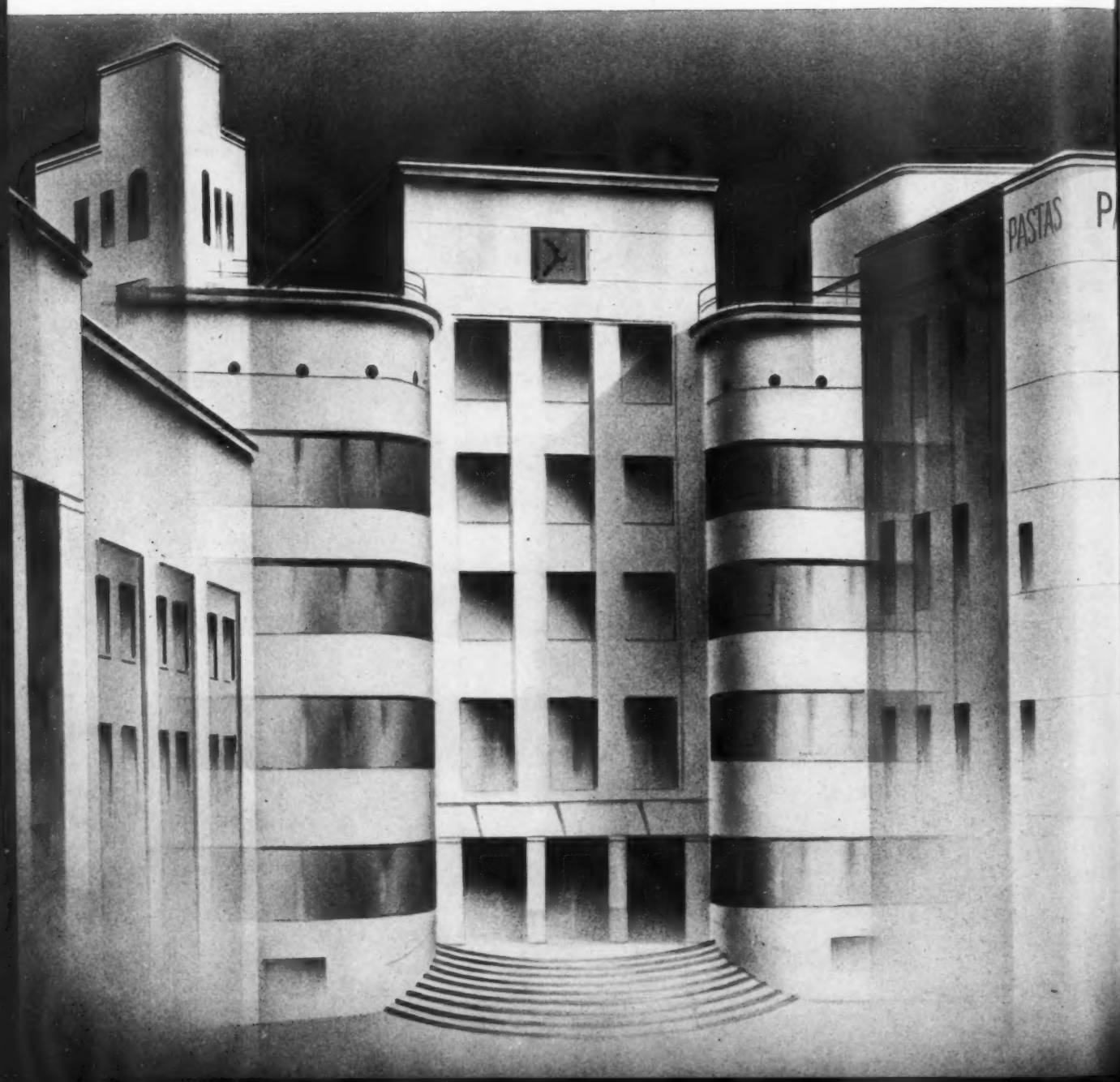
Station Gains by Western Division of Central Electric

The western division of the Central Electric & Telephone Co., with headquarters in Sioux City, Iowa, reports a net gain of 1,596 stations for 1936. This represents a gain of 4.2 per cent and compares with a gain of 1,921 stations in 1936. The company has recovered 15.5 per cent of the losses in stations experienced during the depression years.

The Minnesota district enjoyed the largest gain in 1936, namely, 677 stations or an increase of 8.2 per cent in development. The Farmington district experiences a gain of 7.8 per cent; the Parker district, a gain of 4.1 per cent; Iowa-Illinois a gain of 3.8 per cent; South Dakota, a gain of 1.5 per cent; and North Dakota, a net loss of six stations, largely due to drought conditions.

View of Passengers in New Skylounge Mainliner Now in Service on the United Air Lines Non-Stop Schedule Between Chicago and New York. The Stewardess Can Talk to Pilots Over Connecting Telephone.

new



YET HISTORIC

Strowger in the progress of a Nation . . . . . .

From the aftermath of the Great War Lithuania, tree-clad country of legend and knightly story, emerged once again a self-governing nation. Rehabilitation of public services and national resources followed as rapidly as circumstances permitted. Telephone communications received the special attention which their importance warranted, and Strowger automatic telephone equipment was chosen to aid in this romantic task of rebuilding a nation.

Klaipeda exchange, with an initial equipment of 3,000 lines and an ultimate capacity of 7,000 lines, was placed in service some twelve months ago, and now Kaunas area also enjoys Strowger service. Kaunas Main exchange contains equipment for 7,500 lines, increasing to 10,000 lines, and accommodation for a further 10,000 lines, while Sanciai satellite caters for 700 subscribers initially with capacity for 1,500 subscribers ultimately. The development and progress of Lithuania, allied with the advantages of Strowger service, will make telephone growth rapid. Every provision has therefore been made in engineering the scheme to facilitate the installation of the second 10,000 line unit and other satellite exchanges.

THE STROWGER DIAL ROTATES WITH THE WORLD

AUTOMATIC TELEPHONE & ELECTRIC · CO · LTD

Formerly Automatic Electric Co., Ltd.

NORFOLK HOUSE • NORFOLK STREET • LONDON W. C. 2 • ENGLAND

STROWGER WORKS • LVERPOOL • ENGLAND

Lithuanian Capital Has Modern Telephone Equipment

By W. G. TAYLOR
Automatic Telephone & Electric Co., Ltd.

NEW SYSTEM cut into service in Kaunas, capital city of Lithuania. Installation comprises two exchanges, Kaunas Main and Sanciai. Equipment is of the line-finder type similar to that installed in 1935 in Klaipeda. Provisions are made for future growth of the city

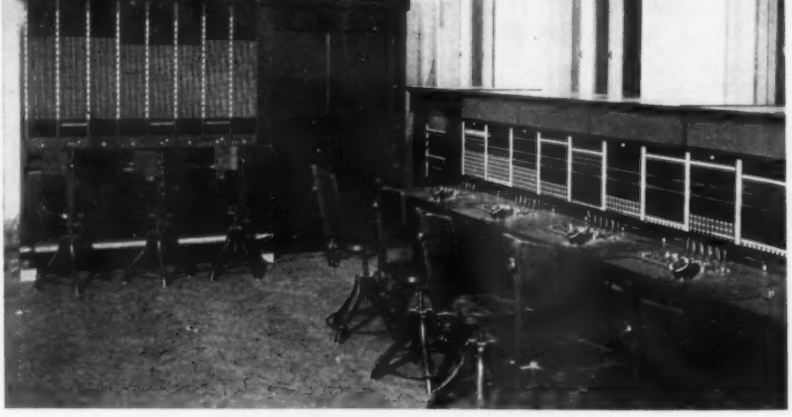
LITHUANIA, a country of vast forests and wide agricultural areas, is steadily pressing forward with a program of national development. Communication services, a necessary part of the general plan, have received early attention and the telephone system is in process of modernization and expansion.

As reported in TELEPHONY of July 25, 1936, part of the new telephone system was brought into use in the port of Klaipeda when the Strowger automatic telephone exchange was opened in December, 1935. Since the completion of the Klaipeda installation, work on the new postal building and telephone installations for Kaunas has proceeded apace; and now by the cutover of the capital's telephone system to Strowger automatic October 24, 1936, another landmark in the country's progress has been set up.

The Kaunas area at present comprises two exchanges, the Kaunas main exchange with 7500-10,000 lines, and its satellite, Sanciai, with 700-1500 lines. Kaunas is a compact area so the main exchange building has been planned to accommodate a second unit of 10,000 lines.

The equipment at Kaunas main and Sanciai is of the A. T. M. Strowger line-finder type, with 200-point, two-motion finder switches employing partial secondary trunking, and is similar to that in the Klaipeda area.

With the prospect of a rapid telephone development in mind, provision has been made in designing the trunking scheme to facilitate the installation of the second 10,000 line unit and other satellites, to take care of the growth of the area as and when necessary.



View of the Kaunas Aviso and Toll Board.

Attractive Building at Kaunas, Lithuania, Where New Telephone Equipment Has Been Installed.

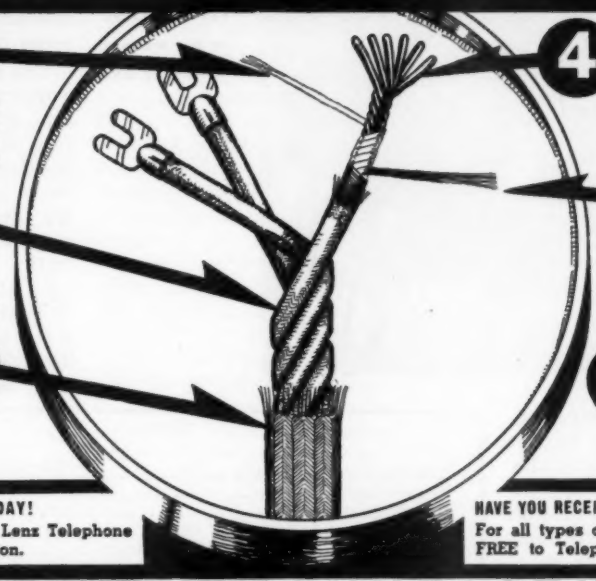
The numbering scheme follows:

	Present	Ultimate
Kaunas	20,000-27,499	20,000-29,999 30,000-39,999
Sanciai	41,200-41,899	41,200-41,999 40,100-40,799
Toll	0	
Inquiries	91	
Complaints	92	
Test desk	99	
Assistance	90	

The assistance service may, perhaps, be mentioned as of interest in that it provides for the reception of emergency calls which are given priority of attention by an operator on the manual board.

The service is intended, primarily, to take care of calls for ambulance, fire engine or police, but may be extended to deal with all calls of an

6 POINTS OF SUPERIORITY IN THESE NEW LENZ TELEPHONE CORDS



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With improved moisture-resisting and body-acid resisting qualities. Its improved insulation resistance minimizes possibilities of electrical leakage.

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Cords of three conductors or more are twisted together so as to give maximum flexibility, uniformity and less liable to kink.

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The finest wear resisting textile available is used in outer braid, assuring long life.

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The Double Wrapped Conductor Ribbon is Bronze Alloy, selected for its greater physical strength and ability to withstand hard usage without breaking.

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WHEN sleet and ice take pole lines down, your first thought is restoration of service in the shortest possible time. Then it is that T-C service can be best appreciated.

With stocks always containing from 150,000 to 175,000 poles and with six large treating cylinders in plants at Spartanburg, South Carolina and Wilmington, North Carolina, T-C takes particular pride in the swift storm emergency service it invariably renders.

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THE T-C LOGICAL POLE

Motor Generators Installed in the Kaunas Telephone Exchange.

urgent nature and not properly classified either as complaints or inquiries. This conserves the time of the operators on these positions and at the same time affords a very useful service to subscribers, whereby necessary help can be given to them.

The automatic equipment provided is listed in the accompanying table.

The design of the automatic equipment is based upon the well-known practice of the British Post Office and effects the maximum economy in switch quantities consistent with provision for the specified availability of trunks.

The small number of toll selectors at Kaunas exchange is due to the adoption of "Aviso" positions which will be described briefly as follows:

The manual equipment provided at Kaunas includes—

Toll switchboard: seven three-position, seven-panel sections of which 20 positions are equipped, each having five cord circuits.

Aviso positions: one three-position, eight-panel section; each position is equipped with 26 cord circuits.

Toll record: one four-position section.

Inquiry complaint and information: One four-position section.

Supervisor's desk: one position.

Test desk: One two-position desk.

The function of the Aviso positions is to complete toll calls. Each position has access to a full multiple of the local subscribers' lines, and being equipped with plug-ended tie lines from the toll positions, is enabled to connect any line on demand from a toll operator. Order-wire working is used and the tie line is assigned by the Aviso operator.

	Kanuas.	Sanciai.
Line and cut-off relays	7,500	700
Subscribers' meters	7,500	700
Traffic meters	120	34
Primary line-finders (200 lines)	678	66
Secondary line-finders (uni-selectors)	114	17
Local first group selectors, 20-10 digit-absorbing	402	...
Incoming third group selectors 10-20	535	...
Discriminating selectors repeaters 10-10	...	42
Toll selectors 10-10	5	12
Incoming selectors, diget-absorbing 10-10	...	29
Special second group selectors 10-10	17	...
Regular final selectors 200 pt.	504	36
Combined regular and P.B.X. final selectors	60	14
Combined regular and toll final selectors	68	19
Combined regular P.B.X. and toll final selectors	8	7
Test final selectors	38	4
Test distributors	8	1

Table Showing What the Automatic Equipment Installed at Kaunas Includes.

Once the connection is established, the toll operator has full control until the clearing signal is given to the Aviso operator by taking down the connection on toll position. Should the local line be engaged, the toll operator receives a busy signal but is enabled to offer the toll call by operating a key.

If the call is accepted, the toll operator breaks down the local call and releases the automatic switches by operating a key and the toll call proceeds normally.

The principal advantages of Aviso working are the saving in operating time and automatic switches. Therefore, it is the practice to use Aviso positions only during the busier hours of the day. At night and during the slack periods of the day, toll calls are completed over the automatic switch train. This train of toll switches affords toll offering and "forced release" facilities. It also gives a "busy on toll" tone so that the toll operator may not interrupt an established toll call.

Inquiry, information, complaint and assistance services are centralized at Kaunsas as is the testing; therefore, no manual equipment is required at Sanciai.

View of Equipment Room at Kaunas Exchange Showing Intermediate Distributing Frame and Finder Rack.

The following power plant is provided at Kaunas:

One 26-cell battery 1500-2000 AH.

Two 23-cell meter batteries 11 AH.

One power control board.

One engine-driven alternator set, 33 kw. output.

Two motor-generator sets with output of 210 amperes at 50 volts.

One motor-generator set with output 100 amperes at 50 volts.

Two ringing machines (one supply-driven and one battery-driven with output of three amperes at 75 volts.

The power plant is designed to supply the exchange under full float conditions with 23 cells of battery floating. Automatic voltage regulation maintains the terminal pressure of generators within plus or minus 1 per cent between no load and full load.

The switching arrangements provide that any one, two or all three motor-generators may be connected as required by the exchange load. The engine-driven alternator provides an alternative source of supply for the motor-generators and exchange lighting in the event of failure of the main power supply. The change over is effected by a three-pole switch on the supply panel.

Freshening charges may be given to the battery by generator No. 3 which has special connections for the purpose. During this operation the battery is isolated from the exchange and the other generators supply current direct to the exchange.

The power plant supplied for Sanciai exchange is designed to operate on the duplicate battery scheme, but switching facilities are provided so that the exchange may be operated direct from a motor-generator with either battery floating.

The equipment includes:

Two batteries, each of 25 cells 240-420 AH.

Two meter batteries, each of 25 cells 11 AH.

Two motor-generators, output of each 55 amperes at 57 volts.

One power control board.

The entire equipment was designed, manufactured and installed to the specifications of the Lithuanian Ministry of Communications, by Automatic Telephone & Electric Co., Ltd., of Strowger Works, Liverpool, England, in cooperation with the telephone staff of the ministry.

▼ ▼

Five Years of Progress of Virginia Company

The January issue of the South East Division News contained a review of five years of progress by the youngest division of the Central Electric & Telephone Co., dedicated to R. A. Phillips, vice-president and general manager, of Sioux City, Iowa. The Central Electric & Telephone Co. and Virginia Telephone & Telegraph Co. which have their headquarters in Charlottesville, Va., closed the five-year period ended December 31, 1936, with a net station gain of 2,621 stations, or 17.1 per cent. This brought the total number of telephones up to 17,909.

In the fall of 1932 the division conducted its first organized drive for new business. It was most successful and the resultant gain held the loss for that year down to 134 stations, or less than 1 per cent. In 1933 a net gain of 482 stations was recorded in 1934, a gain of 488; in 1935, a gain of 730; and in 1936, a gain of 1,055 stations.

The review directs attention to the fact that the prevention of needless moves by reselling the subscriber upon the idea of keeping his telephone, played a very important part in holding and increasing development during the depression days. No doubtful removal order was allowed to be executed without the approval of the group manager; thus hundreds of subscribers were held by talking things over with them.

Improvement in the appearance of central office headquarters has been found to be a help to business. In 24 exchanges new central office headquarters have been provided and in other offices facilities have been improved.

A very marked increase in the volume of toll business has been experienced. Toll and telegraph billings in December, 1936, represented an increase of 53.3 per cent over the billings for the same month in 1932. Toll hookups to more than 40 points have been improved either by rearranging or renewing existing toll facilities or by constructing new or additional lines.

Good collections, the review states, have promoted the sale of telephone service, especially when collection policies have been enforced with the exercise of common sense salesmanship. In December, 1936, only eight exchanges in the South East division had as high as 10 per cent of their accounts outstanding. In contrast, five years previously there were only four exchanges with as little as 10 per cent outstanding.

Many of the 49 exchanges served by these companies have made remarkable progress in the past five years, and it is anticipated that the territory will experience a healthy growth and development in the future. The Front Royal, Va., exchange, now serving 800 stations, will be cut over to common battery operation this year. A large manufacturing concern, which will eventually employ 5,000 persons, has made arrangements to

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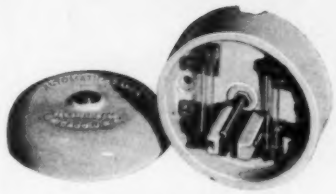

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locate in that city and preparations are being made for the increased demand for telephone facilities anticipated.

On the inside front cover of the South East Division News for January is reproduced, through courtesy of the Charlottesville Daily Progress, a cleverly illustrated biographical sketch of Major Leonard D. Densmore, vice-president and general manager of the southeastern holdings of the Central Electric and of the Virginia Telephone & Telegraph Co.

▼ ▼

Business Steady Despite Dust Storms, Lack of Rain

In spite of the fact that Nebraska has again failed to receive the normal amount of winter precipitation and that there have been a number of dust storms which stripped layers of top soil from acres in many sections, there has been no recession in business. During January and February the Lincoln (Neb.) Telephone & Telegraph Co. added more than 200 subscribers to its list and increased toll revenues at a time when a slump was expected.

▼ ▼

Bell February Station Gain Sets Record

The Bell System last week announced a net gain of 92,200 telephones on its lines in February. This compares with a gain of 95,600 stations in January and with one of 66,400 in February, 1936.

For the first two months of 1937, the net gain was 187,800 telephones, the largest increase for the period on record excepting gains through acquisition of new companies, compared with a gain of 123,400 telephones in the first two months of 1936.

SELLING POINTS

By MISS ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

A CHIEF OPERATOR said to me recently: "I haven't the nerve to solicit the people in this town any more to order a telephone. I have been over my territory so many, many times that my selling points seem to be stale and worn-out with usage. Why can't we have some up-to-date methods of selling service?"

"I wonder how the merchants go about selling goods. They seem to be eternally advertising," I remarked.

"Well, they get up attractive ads for newspapers, in which they offer appealing price reductions on certain items, for short periods of time," pointed out the chief operator. "That attracts people to the stores and the result is they purchase more than the sale articles. Counters and windows are frequently showing different, interesting displays. We hear people say, 'Have you seen Woodbury's window display this week? It is unusual.'

"Our telephone companies cannot do any of these things. They cannot cut rates for short periods of time, such as a few days, in order to stimulate interest, as other business places do. We have nothing tangible to show our public. Our selling line is just talk, talk, talk; if our prospects do listen, it is generally at a time when they pause from doing what concerns them most to hear us out—and I mean 'out' in more ways than one!

"But in selling their own commodities it is different. When they have time to read their evening papers, or glance into show windows enroute to and from the movies, etc., their minds are relaxed from their own business affairs and thus in better frame to observe displays of competitors."

I think this chief operator has given us something to think about, so I am passing it on by means of this article to telephone companies for their consideration. Our public, even in this day and age, has a vague idea, in general, of the worthwhile uses it can derive from a telephone—about as vague an idea as the family of Johnnie had according to the following story:

"Mrs. Jordon, can I use your telephone?" asked Johnnie.

"Why, certainly, Johnnie," said Mrs. Jordon. "Is yours out of order?"

"Not exactly," said Johnnie, "but Sis is using it to hold up the window 'cause the rope is broke, Mother's cutting biscuits with the mouthpiece, and the baby's teethin' on the cord."

Company Not Liable For Death by Lightning

THE TEXAS SUPREME COURT on January 6, reversed the rulings of the court of appeals and the trial court in the case of Western Telephone Corp. vs. McCann et al. which had awarded a judgment of $15,000 in favor of defendants in error, Jack McCann and his five minor children, against the plaintiff telephone company in error for damages for death from stroke of lightning while the deceased was standing on the porch of her home.

The high court held that the plaintiff had failed to prove, except by resort to unauthorized speculation and assumption, that the stroke of lightning causing death first struck the telephone pole 180 feet from the house of the defendant, was carried along the telephone wires to the pole immediately in front of the house, thence along the drop wire leading to the roof of the house where the drop wire ended, the telephone having been disconnected, and then jumped from there to the body of the deceased.

Failed to Prove Company Was Negligent

In other words, the defendants in error failed to prove that the telephone company's negligence in leaving a disconnected drop wire ungrounded, with its end exposed, was the proximate cause of Mrs. McCann's death.

The court stated that in view of the testimony of four specialists in the field of electricity as to the phenomena of lightning—each of whom expressed the opinion that Mrs. McCann was struck and killed by a side stroke or independent discharge of lightning which accompanied the main stroke that destroyed a telephone pole—the testimony of the plaintiffs (defendants in error before the supreme court) fell far short of even tending to negative the idea that Mrs. McCann's death had been caused by some agency wholly independent of the negligence of the defendant.

Appearing before the Texas Supreme Court, Prof. S. W. Bass, Texas College of Arts and Industries, Kingsville, Prof. W. R. Work, Carnegie Institute of Technology, and Prof. E. J. Shimek, Rice Institute, Houston, concurred with Prof. C. L. Kinsloe, head of the department of electrical engineering of Pennsylvania State College, in the following statement:

The popular conception of a "lightning stroke" is that it consists of a simple, single passage of electricity, over a well-defined and continuous path, from the clouds to earth. This idea is entirely wrong. The fact is that this natural phenomena is highly complex. This may be merely between clouds or to earth, and usually it is of rather limited severity. However, this primary discharge immediately releases subsequent or secondary discharges which may be, and very frequently are, of much greater severity than the original discharge.

A single, isolated discharge, in all probability, never occurs. Moreover, usually there is not a single discharge through one definite path from clouds to earth. Ordinarily, there are multiple paths to earth, which fact accounts for the common experience of more than one object being "struck by lightning" at a given time and in the same general area, although the affected area may be quite large. Due to the great rapidity with which these discharges follow each other they may appear to occur simultaneously. Not all of these discharges are of equal violence, nor do they all result in the same damage. Frequently, the condition here described is visible to the naked eye, and so-called "forked lightning" is a familiar sight.

Finally, it must not be assumed that during a discharge, electricity will necessarily follow an all-metallic path where such a path is provided. It has been pointed out that under the abnormal conditions preceding a "lightning stroke" air and other substances become good conductors of electricity, and frequently they offer less opposition to the pasage of high-frequency currents than do metallic substances.

It is for this reason that lightning rods all too often fail to protect a barn or other building to which they are attached. Many instances are known where lightning will strike the roof of a building rather than a lightning rod installed on the same roof, and will go to ground through the building rather than through the metal wire which connects the rod to the ground.

Excerpts From Opinion of Texas Supreme Court

Other excerpts from the opinion of the supreme court follows:

"We have numerous decisions to the effect that the causal connection between a defendant's negligence and a plaintiff's injury must not be left to surmise or conjecture, but we believe the most accurate rule to be applied in the present case is the one stated by the Supreme Court of Michigan in the case of Broudy v. Railway Company, 151 N. W. 575:

'It is elementary that the burden is upon the plaintiff to establish by competent evidence not only the negligence of the defendant, but also to establish

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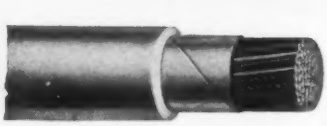
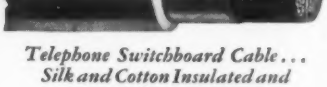
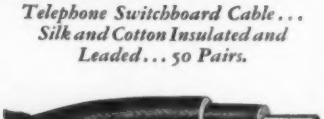


Twisted Pair Telephone Wire... Rubber Insulated and Braided.

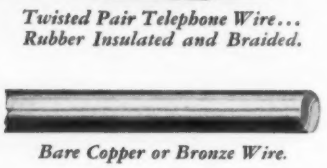


Bare Copper or Bronze Wire.



Galvanized Steel Strand.

Telephone Cable... Paper Insulated and Leaded... 150 Pairs.



Bare Galvanized Steel Wire.

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a direct connection between such negligence and the injury. The plaintiff does not sustain such burden by showing that the injury may have resulted from the defendant's acts, but he must at least show that that fact follows as a reasonable inference from the basic facts and circumstances. Whenever it is necessary to aid such proven basic facts and circumstances by conjecture, plaintiff must be held to have failed in his proof.'

The same rule is likewise very forcefully stated in the case of Byerly v. Consolidated Light, Power & Ice Co., 109 S. W. 1065 . . .

A practical application of this rule has been made by the Court of Civil Appeals at Texarkana in two cases where there was an injury by lightning. The first case is that of Southwestern Telegraph & Telephone Co. v. Morris, 106 S. W. 426. In that case plaintiff's horse had been killed by lightning while apparently standing under a telephone wire which was suspended only a foot or two above his head.

There was evidence showing that lightning had struck one or some of the telephone poles and had also struck a wire fence nearby. It was contended by plaintiff that the horse was killed by a current of electricity jumping from the sagged wire to the head of the horse. In denying liability, the court said:

'. . . Was the horse killed by electricity which came from the wires, or directly by a bolt of lightning from the clouds? If the same bolt of lightning struck both the telephone line and the horse, but if the wire did not control the path of the bolt from the clouds to the earth so as to be the proximate cause of the bolt's striking the horse, the appellant as a matter of law would not be liable. It is not sufficient that the wire was a possible consequence of conducting the lightning to the horse.'

The other case is that of Lumpkin v. Texarkana Gas & Electric Co., 164 S. W. 435, where the facts were in some respect similar to the facts here. The court held in that case that the plaintiff had failed to prove a case of liability on the part of defendant.

Conclusion Based on Speculation Is Not Justified

In the case of Texas & N. O. R. Co. v. Warden, 78 S. W. (2nd) 164, in an opinion adopted by the Supreme Court, the following holding was made, as shown by the syllabus:

'Facts may be established in civil cases by circumstantial evidence, but, for other proven facts to establish fact, main fact sought to be proved must follow as natural or very probable sequence from facts actually proven, and conclusion based on mere speculation from facts or circumstances proven is not justified.'

. . . The case of Sinkovich v. Bell Telephone Co., 133 Atl. 629, by the Supreme Court of Pennsylvania, is in all essential particulars almost directly in point. In that case the court held that even if defendant's expert testimony be disregarded, plaintiff had failed to prove liability. The case was reversed and remanded with instructions that judgment be entered for defendant. The following cases are also to some extent similar upon the facts and are authority for holding that plaintiffs were not entitled to recovery. Stecher v. Southwestern Bell Telephone Co., 295 Pac. 709; Illinois Power & Light Corp. v. Hurley, 30 Fed. (2d) 905."

Answers to Traffic Questions on Page 14

1. Yes. Failure to do so would frequently result in the calling party's line being busy when the called station or party had been reached. This would delay the completion of the long distance call, which the customer is usually anxious to have completed without delay; it would be annoying to the called party as he would have to be dismissed with the explanation that the calling party's line is busy, and it would also result in a waste of circuit time and operator's time.
2. When a "WH Party Report" is received from a distant operator the originating operator enters "wh (time)" on the original OUT tickets if it is immediately available.
3. A remote control operator handles local and toll calls for subscribers in a distant city. If a subscriber in the remote control area wishes to place a local or toll call, he signals the remote control operator who establishes the connection.
4. Please refer to preface.
5. Not necessarily although this record is helpful in completing calls referred to Information. Whether or not this record should be maintained is a question to be determined by the management of the telephone company.

Commission and Court Activities

Tennessee Handset Charge Limited to 18 Months

The extra monthly charge of 15 cents for handset telephones, charged by the Southern Bell Telephone & Telegraph Co. in its Tennessee exchanges, has been limited to 18 months under a compromise order issued February 19 by the Tennessee Railroad & Public Utilities Commission, effective March 1. This will result in an estimated saving to subscribers of $70,000 per year.

The additional handset charge will be immediately canceled for 30,200 subscribers already having paid the charge for 18 months or more, and an average of 2,000 per month will be relieved of the charge. It is estimated there are 58,000 handset users in Tennessee.

The company attempted to secure a 30-months' minimum for the surcharge but finally reached an agreement with the commission, following which a public hearing scheduled for March 2 was canceled.

The telephone company gave four principal reasons for the surcharge: First, that manufactured costs of the handset are heavier than for desk telephones; second, that maintenance costs are higher; third, that every change over to the handset makes a present piece of equipment obsolete, and fourth, that the surcharge is necessary to deter all subscribers from suddenly switching to the handsets.

Several years ago the Tennessee legislature, aroused because of a state-wide complaint against a 50-cent surcharge for the handsets, slashed the charge to 25 cents by legislative enactment.

A commission order about a year ago reduced the surcharge from 25 to 15 cents per month, but allowed the surcharge to remain indefinite.

The commission reiterated its intentions of going into the entire rate structure of the Southern Bell company late this spring or in early summer in a special study of intrastate toll rates.

▼ ▼

Court Hearings Resumed in Wisconsin Bell Cases

Trial of Wisconsin Telephone Co. appeals from three orders of the Wisconsin Public Service Commission was resumed March 8. The trial was adjourned February 1, after the company completed its case, by Judge August C. Hoppmann in Dane County Circuit Court at Madison. The adjournment was taken to permit the commission to prepare for cross-examination and rebuttal testimony on evidence which the company introduced in five days of hearing the latter part of January (TELEPHONY of February 6 and 13).

At the opening of the hearing on March 8 Frederic Sammond, Milwaukee, company attorney, directed Judge Hoppmann's attention to the company's application filed with the commission March 5 to make a 4.4 per cent surcharge for 12 months on exchange service to recoup about $500,000 in emergency relief taxes levied by the 1937 legislature.

Mr. Sammond stated the company's willingness to show the bearing of the taxes on the rate orders in arguments and briefs.

Except for one question asked George F. Crowell, company chief engineer, in cross-examination by Harold M. Wilkie, special counsel for the commission, A. R. Colbert, commission chief accountant, was the first witness. Mr. Colbert testified that the Wisconsin Telephone Co. earned a return of 7.37 per cent on its exchange business in 1936 on the basis of the commission's valuation of the company's exchange property and adjustment of company expenses.

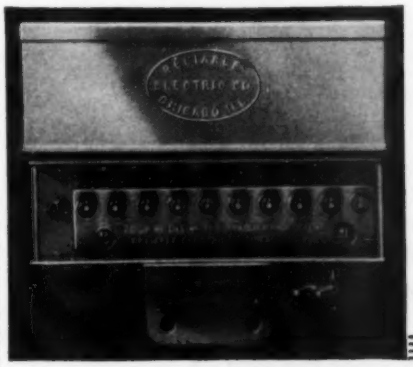
He explained that his figures on rate of return are on the $35,000,000 valuation of exchange property made by the commission and that net operating income used is that which results after the adjustments were made in expenses, such as depreciation, relief and pension department cost, legal expenses in court on rate case, rate case expense, license fees of $176,592 paid the A. T. & T., disallowed as an operating expense, and adjustment and reclassification of toll revenue, $290,206; leaving the company $3,292,930 return or 7.37 per cent.

This rate of return assumes that the rate reductions ordered by the commission and enjoined in court were in effect.

▼ ▼

Wisconsin Company Asks to Pass On New Tax to Public

Hearing will be held March 15, on the application of the Wisconsin Telephone Co., filed March 5 with the state public service commission, for permission to add a 4.4 per cent surcharge on all exchange service telephone bills for a period of 12 months. The emergency state tax which the company is endeavoring to



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pass on to its subscribers was levied by the 1937 legislature to finance the payment to counties of $545,000 of back claims for old age assistance and pensions for the blind and for dependent mothers.

Surveys made by the Wisconsin Public Service Commission indicate that if the application is granted the cost of four-party residence telephone service in Madison will be increased by nine cents; the cost of two-party residence service by 10 cents; the cost of private line residence service by 11 cents; and the cost of business service by 22 cents. This would increase the telephone bill for Madison subscribers by approximately $34,513 for the 12 months.

President W. R. McGovern of the Wisconsin Telephone Co., asserts that this tax is discriminatory against the telephone industry.

"The counties have expended about $545,000 in excess of state appropriations," he said. "To meet the entire deficit, the legislature imposed a heavy tax only on the telephone industry which will provide about $750,000, or more than $200,000 in excess of the entire deficit. The amount of this tax assessed against the Wisconsin Telephone Co. is $686,000, which is 91 per cent of the total tax and about $140,000 more than the entire deficit."

After deduction of all other expenses in 1936, taxes took 43 cents of each dollar of the balance of the telephone company's income, Mr. McGovern declared. The new tax would take 10 cents more on each dollar away from the company he insisted.

Although total taxes levied against the company under the new law are $686,516, the company is asking to charge to subscribers only $504,125, the tax on exchange services. It is not asking a shift in the tax on toll revenues.

The company's application for surcharges would exempt public paystations, customer service connections, and telephone broadcasting facilities."

▼ ▼

Delay in Ohio Bell Case Denied

The request of the Attorney General of Ohio for a delay in the arguments in the refund case of the Ohio Bell Telephone Co. has been denied by Chief Justice Hughes of the United States Supreme Court.

The case is set for argument April 5.

▼ ▼

New Trial Upheld in Damage Suit

The Rhode Island Supreme Court January 16 upheld the granting of a new trial of the negligence action brought by Miss Maria Emma Nichols of Springfield, Mass., against the New England Telephone & Telegraph Co.

Miss Nichols was given a verdict of $5,500 by a Superior court jury two years ago. She sought $30,000, charging that she received injuries through the company's negligence in replacing a telephone pole. The sidewalk at the site of the pole subsequently caved in.

The opinion was prepared by Justice A. A. Capotosto. The original trial was held before Judge G. Frederick Frost and a jury in March, 1935, and a new trial was granted the following April 23.

Miss Nichols, formerly of 627 Plainfield street, and then proprietor of a fish and chip store at 600 Plainfield street, charged the company with negligence in removing a pole and replacing it with another, in the latter part of May, 1932, in front of 615 Plainfield street. She was thrown and injured when the sidewalk caved in under her right foot as she stepped from the roadway. Her contention was that the company's negligence caused the cave-in.

Her counsel argued before the state supreme court that the trial justice, in passing on the question of the telephone company's negligence, departed from the accepted rule that governs in negligence cases, namely, that the plaintiff is only required to prove the defendant's negli-

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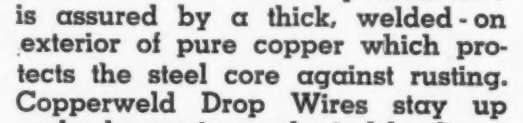

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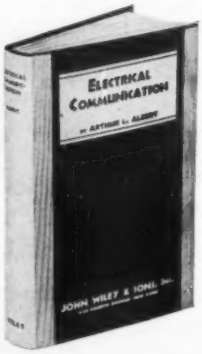

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gence by a fair preponderance of the evidence.

"In our consideration of the record before us and of the plaintiff's contentions in respect thereto, we have given the plaintiff the benefit of every inference that was reasonably justified by the evidence," said the opinion. "Yet we cannot say that the trial justice was clearly wrong in deciding that the defendant was entitled to a new trial."

▼ ▼

Telephones Seized in Gambling Ordered Forfeited

Telephones, a public address system and $51 in money, seized by police of Westport, Mass., in a raid on "The New Cedars," where bets on race horses were allegedly made, were ordered forfeited on February 12 by Judge James P. Doran in New Bedford district court despite opposition by counsel for the New England Telephone & Telegraph Co. and Attorney James Seligman of Fall River, Mass., representing other interests.

Because Attorney Seligman was not prepared to furnish a bond, pending appeal on the legality of the seizure, Judge Doran reserved formal decision. Leland Powers, representing the telephone company, posted $200 bonds pending the June appeal.

"While I consider both the telephones and the amplifier innocent in themselves," Judge Doran ruled, "they were not innocent to the use in which they were put. They were used for illegal purposes. I am very much interested in having the supreme court rule. There has been no supreme court decision."

"Only six superior court judges have ordered them returned," Attorney Powers reminded the judge.

▼ ▼

Doctor Sues to Recover Overcharges

Dr. H. D. Eichacker, maternity specialist, who lives and has offices at 60-21 Putman avenue, Ridgewood, Queens, N. Y., has filed suit against the New York Telephone Co. in Queens Municipal Court to recover $190 which, he alleges, is owed to him for overcharges since 1923. He contends that he was billed for having a commercial telephone, whereas he should have been charged for a residential telephone.

In his action, Dr. Eichacker said he had the full support of more than 1,000 members of the Queens Medical Society, many of whom also have offices at their homes. His counsel is E. F. W. Wildermuth, of Forest Hills, Queens.

"Some time ago I read an article in the American Medical Magazine relating to telephone charges of physicions," he explained. "I then realized I had been charged for a commercial telephone, whereas I should have been charged only for a private residence telephone. I investigated and found that in 1923 the New York Public Service Commission had given a decision which upheld the contention that such a telephone as mine was a private telephone.

"I happened to look at the listing of my telephone in the telephone directory and I found that after my name they had inserted the abbreviation 'off.' Now that was done without my knowledge or consent. There had never been any change in the contract I had with the company; so far as I was concerned there was no authorization for this altered designation."

▼ ▼

Sentenced to Penitentiary For Coin-Box Stealing

Charles Parker, alias Jerry Mills, 26, of New York City, described as the only person in the country who could make a key opening telephone depositories, was found guilty recently of stealing telephone coin boxes in Cleveland, Ohio, last year. Parker, who denied the accusation, is on probation for a similar offense in New York.

Common Pleas Judge Frank J. Merrick sentenced him to one to 20 years in the Ohio penitentiary. The jury deliberated two hours.

Assistant County Prosecutor John J. Mahon said the Ohio Bell Telephone Co. reported $1,600 had been taken from 129 telephone pay stations between April and September.

▼ ▼

Pennsylvania Bell Ordered to Make Reparation

The fight that Dr. Caroline M. White, a physiotherapist of Harrisburg, Pa., put up to obtain a $3-a-month residential rate from the Bell Telephone Co. of Pennsylvania, instead of the $6 business rate, ended when the Pennsylvania Public Service Commission issued an order directing that she be paid $91.50 within 15 days.

The order was dissented to by Chairman C. J. Goodnough. It was made as a result of a petition filed by Doctor White last June after the commission had ruled that she was entitled to a residential rate because she maintained her office at her residence as do many physicians. The reparation sought covered the period from December, 1928, to February, 1936.

▼ ▼

Metered Telephone Service Claimed Discriminatory

Lee Wells has filed a formal complaint with the Nebraska State Railway Commission alleging that the meter rate for telephone service in Omaha is unjust,

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Theory and Practice of the Magneto Telephone Exchange (Continued)

Main Frame: The main frame is a unit of telephone equipment which serves to conveniently terminate the outside cable pairs at a point where they enter the telephone office and also the switchboard lines. Thus any subscriber's line can be connected to any desired switchboard line. Main frames also serve as a point at which protective equipment to guard against lightning and power disturbances, can be

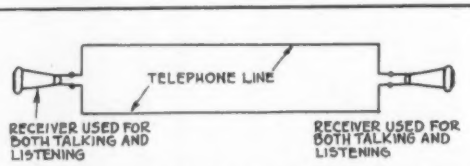

FIG.2. SIMPLE TELEPHONE SYSTEM USING TWO RECEIVERS.

connected to each entering telephone line to protect the central office equipment.

Subscriber's Set: The instrument over which each telephone subscriber carries on telephone conversation is referred to as a telephone substation set, or subscriber's set. This latter term is frequently shortened to "subset."

Transmission: Inasmuch as telephony involves essentially the transmission of the human voice from one point to another by means of electrical waves, this term has come into common use when defining the quantitative or qualitative character of telephone service with reference to the ability to hear distinctly; that is, when we say the transmission is good, we mean that two subscribers can hear each other satisfactorily over a given wire.

Basic Principle of the Telephone

The transmission of sound from one point to another requires at the transmitting end, where sound waves are converted into electric waves, *some means of causing an electric current to vary in intensity* in response to sound waves. At the receiving end of a telephone circuit, a reproducing device, which will *change the variations in electrical current back into sound waves,* is needed.

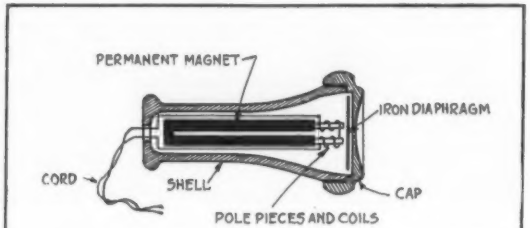

FIG .3. SCHEMATIC OF TELEPHONE RECEIVER CONSTRUCTION.

One of the simplest types of telephone circuits, although not a practical one for general telephone service, consists of an ordinary telephone receiver, such as is found on any telephone set, connected to each end of the communication line as shown in Fig. 2. When sound waves are impressed on the receiver at one end of the line, a variation in air pressure on the diaphragm, due to the sound waves, causes the diaphragm to vibrate at a *frequency* the same as that of the sound source.

FIG. 4. PARTS OF A TYPICAL POLARIZED TELEPHONE RECEIVER.

Vibration of the thin iron receiver diaphragm *causes a variation in the magnetic flux* linking the coils wound on the pole pieces of this receiver. This variation of magnetic flux generates a very feeble voltage which, however, is sufficient to cause a minute current to flow over the two conductors of the communication circuit to the distant receiver.

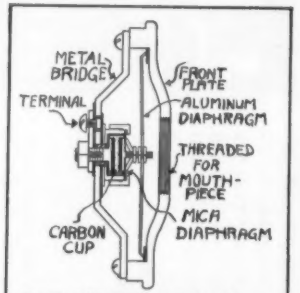

FIG.5. CONSTRUCTION OF CONVENTIONAL TRANSMITTER.

At the distant receiver, this current, flowing in the receiver coils and varying in intensity, causes the diaphragm to vibrate at the same frequency as the diaphragm of the receiver at the transmitting end. Vibration of the receiving diaphragm results in a movement of the surrounding air which is heard by the listening person as sound.

It is interesting to note that one of Alexander Graham Bell's early telephone experiments utilized just such an arrangement as is shown in Fig. 2.

Fig. 3 illustrates schematically the construction of a telephone receiver. A study of this illustration should make clear how the vibrating diaphragm, by its movement towards and away from the pole pieces, can affect the amount of magnetic flux linking the two coils. It should be observed that the *steady magnetic flux* is provided by means of the permanent magnet. The spacing between the diaphragm and the pole pieces is very small, being about .015 inch. Fig. 4 shows a typical telephone receiver shell and parts.

The Telephone Transmitter

Early experimenters, seeking to devise a more powerful and sensitive telephone and realizing the shortcomings of the magneto type of transmitter just described, discovered this need could best be met by some form of device that would vary the resistance in an electrical circuit carrying current from a battery source. Thus was developed what is commonly known as a telephone transmitter.

illegal, unsound and discriminatory when compared with the flat business and residence rates. He says that the company offers the option of using a metered rate telephone, with 50 free calls and 5 cents for each additional call, or a flat rate.

Mr. Wells says that for metered business service he is required to pay $5.50, but that if he made 1,000 calls after he had exhausted the 50 free call number, he would be paying $55.50 a month while if he paid the flat rate for business he could make all those calls for $10. He asks the commissions to investigate his charge that this results in his financial disadvantage, and to order the company to cease and desist from the discriminatory practices complained of.

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Commission Employes with Motor Association

Paul Halpine, of Omaha, Neb., former secretary of the Nebraska State Railway Commission, has been appointed a field man for the Nebraska Motor Trucks Association, along with Clifford J. Hotz, a commission assistant.

▼ ▼

Commission Rulings and Hearings

Federal Communications Commission Washington, D. C.

February 25: Application filed with telephone division by the Mountain States Telephone & Telegraph Co. for authority to supplement existing facilities between El Paso, Texas, and Alamogordo, N. M.

February 25: Application filed with telephone division by the Mountain States Telephone & Telegraph Co. for authority to supplement existing facilities between El Paso, Texas, and Las Cruces, N. M.

March 3: Application filed by the New England Telephone & Telegraph Co. with the telephone division for authority to supplement existing facilities between Concord and Newport, N. H.

March 4: Application filed with the telephone division by the New England Telephone & Telegraph Co. for authority to supplement existing facilities between Lewiston, Me., and Berlin-Lancaster-Littleton, N. H.

March 22: Continued hearing before telephone division in special investigation of the telephone industry.

Illinois Commerce Commission

March 9: Hearing in Chicago on the commission's citation, on its own motion, against the Illinois Bell Telephone Co. to show cause why there should not be a reduction in rates for intrastate telephone service in the state. (Consolidated with case No. 23774 in which the Illinois Bell company proposes to make changes in certain rates.)

March 9: Hearing in Chicago on application of the Farmers Telephone Co. of Lee County, proposing changes in rates, rules and regulations for telephone service, stated in I. C. C. No. 3 original sheet No. 4 applying to all exchanges of the company.

March 10: Hearing in Chicago on application of the Illinois Bell Telephone Co. for authority to sell certain telephone instruments to the Cincinnati & Suburban Bell Telephone Co.

March 10: Hearing in Chicago on complaint of Henry A. Proesel, et al., against the Illinois Bell Telephone as to rates for telephone service to adjacent exchanges to complainants as subscribers in the county of Cook. Amended complaint filed.

Michigan Public Utilities Commission

February 23: Samaria Farmers Telephone Co., of Samaria, granted permission to increase rates in order to furnish 24-hour service to subscribers instead of the previous hours from 6:00 a. m. to 9:00 p. m. and emergency service the balance of the day.

The new rates are: One-party business, $2.25; two-party business, $2.00; one-party residence, $1.75; two-party residence, $1.50; rural business, $1.75; and rural residence $1.25.

March 12: Hearing on application of David J. Nugent of Mesick for authority to purchase the Wexford Telephone Co.

March 12: Hearing on application of the Lake City Telephone Co. for authority to purchase the property of the Caldwell Telephone Co.

March 15: Hearing on application of the Allen Mutual Telephone Co. for authority to purchase the East Allen Telephone Co.

Minnesota Railroad and Warehouse Commission

March 3: Approval granted joint application of the Red Lake Falls Telephone Co. to sell its telephone properties located in Red Lake Falls, county of Red Lake, and in the village of St. Hilaire, county of Pennington, to Clarence W. Orr.

Nebraska State Railway Commission

March 5: In the matter of the application of the Northwestern Bell Telephone Co. for authority to substitute common battery service for that now being given at its exchange at Kimball; it appearing that 94 per cent of the patrons of the exchange have signified by signatures to a petition asking for approval of change of service, the rates to be increased 25 cents a month, and there being no objections on file, order granting request entered.

March 5: In the matter of the complaint filed by Lee Wells against Northwestern Bell Telephone Co. with respect to alleged discrimination in charges made for service at Omaha exchange; because of failure of complainant to appear, order of dismissal entered. Mr. Wells contended that a patron paying for service on the limited call basis and who had calls in excess that required him to pay more than the $10 flat rate for unlimited calls should not be required to pay more than the flat rate.

March 11 and 12: Hearings held by Commissioners Maupin and Good upon application of the Central Nebraska Telephone Co. for a readjustment of rates at various exchanges; hearings being held at North Platte and Imperial in order to enable protesting patrons to make appearance and present testimony.

Ohio Public Utilities Commission

March 1: With the reservation that nothing shall prevent the parties agree-

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T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

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Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or butt-treated.

ing upon any change in point of contact or otherwise that would not result in any change in rates, the commission approved and filed the toll interchange contract made July 23, 1934, by Alice Fouts, operating as the Philo Telephone Co., with the Ohio Bell Telephone Co., to supersede the contract previously existing between the Ohio Bell company and the Philo company, a corporation.

March 2: Authority granted the Bluffton Telephone Co. to establish, effective April 1, the following schedule of rates for service at Bluffton, subject to a discount of 25 cents per month:

Business, individual, $3.75; business, two-party, $3.25; business, rural, $3.75; residence, individual, $2.59; residence, four-party, $2.25; residence, rural, $2.00.

In granting this authority the commission held that the new rates will not produce excessive earnings. The existing tariff is $2.00 per month for a business telephone and $1.25 for residence service.

March 2: Authority given the Mansfield Telephone Co. to sell 13,218 shares of no par common stock to reimburse its treasury to the amount of $242,689.92. At the same time the company was instructed to inaugurate certain reforms and revised practices in its plant, accounting practices looking to the preservation of the accuracy of the same.

The telephone company in its application had asked for authority to issue and sell at $18.36 per share, $13,900 of no par common stock to reimburse its treasury for $256,947.46 uncapitalized capital expenditures from Jan. 1, 1932, to July 31, 1936. The commission, however, held that it had found such expenditures within this particular period amounted to $242,689.92.

March 4: Upon hearing of the complaint of the Oil Belt Telephone Co. against the Northern Ohio Telephone Co., in which it was set forth that the defendant company had served notice that it intended to abrogate a contract under which there had been a free interchange of toll service between the exchanges of the plaintiff and the Bowling Green exchange of the Northern Ohio company over a period of several years, the commission took the case under advisement.

The plaintiff company, in filing the complaint, asked that the commission fix a toll rate for this interchange of service between the two companies, it having developed that the two companies have been unable to agree upon a rate satisfactory to both.

March 5: The Ohio Bell Telephone Co. filed its answer to the complaint of Joseph F. Riegal and five other residents of the Ottawa Hills district adjacent to Toledo who had applied for service.

The company alleged that it has established its Toledo exchange boundaries, and that the premises of these complainants are situated within the area wherein the service is being furnished by the Sylvania exchange of the Ohio Associated Telephone Co. and that, therefore, the Bell schedules do not apply to such territory. For want of information the Bell company denies all allegations as to the insufficiency and inadequacy of the service of the Associated company.

It further asks that the complaint be dismissed.

South Carolina Public Service Commission

February 17: Order issued ruling that free telephone service between Georgetown and Andrews must be continued by the Home Telephone Co.

The commission had been petitioned by the company for authority to start a toll system on calls between the two towns, which are 19 miles apart.

After the hearing, William C. Wolfe, chairman of the commission, announced its decision.

Tennessee Railroad and Public Utilities Commission

February 19: Compromise order approved setting a minimum of 18 months for collection by the Southern Bell Telephone & Telegraph Co. of the extra monthly charge of 15 cents for handset telephones, effective March 1. Subscribers will be saved $70,000 per year, it was estimated, through limiting the handset charge.

Wisconsin Public Service Commission

March 3: Ten small telephone companies have advised the commission they will continue in effect during 1937 temporarily reduced rates and have been authorized to do so. They are:

Schleswig Telephone Co., New Holstein; Rib Lake Telephone Co.; Wayside Telephone Co.; Norwalk Independent Telephone Co.; Morgan Telephone Co., Oconto Falls; Poy Sippi Telephone Co.; Arkansas Telephone Co.; Westboro Telephone Co.; Blanchardville-Hollandale Farmers Telephone Co., Hollandale; and the Jonesdale & Hollandale Telephone Co., Dodgeville.

March 3: Order issued authorizing Fred Kuhn to sell his telephone exchange in Gresham, Shewano county, to the Caroline Telephone Co. for $8,500 following an inventory and appraisal by commission engineers.

March 3: Barron County Telephone Co. authorized to serve Leslie W. Lowe in the town of Maple Grove near Barron.

March 3: Inter-County Telephone Co. authorized to serve Lee Ableidinger in the town of Albany, Pepin county.

March 10: Hearing in Madison on application of the Wisconsin Telephone Co. for permission to serve three subscribers in the town of Muskego, Waukesha county.

March 15: Hearing on application of the Wisconsin Telephone Co. asking authority to add a 4.4 per cent surcharge on all exchange service telephone bills for a period of 12 months.

March 17: Hearing in Madison on application of the Farmers Independent Telephone Co. for authority to revise its Grantsburg exchange rates.

March 18: Hearing in West Bend on application of the Commonwealth Telephone Co. for authority to revise its rural rates near Newburg and Jackson.

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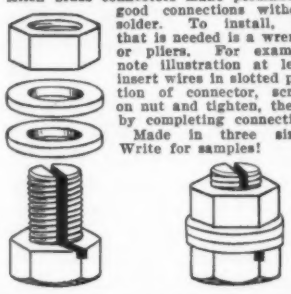

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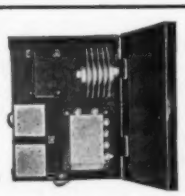

Obituary

FRANKLIN GROVE, ILL.—George W. Blocher, president of the Farmers Telephone Co. of Lee County, died suddenly January 5 at a hospital in Freeport after a brief illness. He was nearly 75 years old.

Mr. Blocher was born near Ashton, Ill., February 28, 1862. He married Letha Brown, of Ashton, in 1887 and they moved to a farm north of Franklin Grove in 1906, where they lived at the time of Mr. Blocher's death. Two children were born, Clifford and Bernice.

For the past three years Mr. Blocher had served as president of the Farmers company and for several years previous to that was vice-president. The company operates exchanges at Ashton, Amboy, Franklin Grove, Lee Center and Sublette, with headquarters at Ashton.

PRINCETON, ILL.—Elmer E. Sapp, former president of the Bureau County Independent Telephone Co. and retired banker of Princeton, died Monday, March 1, at his home here after an illness of five months. He was 70 years old.

BROWNSBURG, IND.—Clyde L. Cummings, age 61, was found dead in the telephone office building here recently. He was owner and manager of the Brownsburg Telephone Co. and had been in this community eight years. A post mortem revealed death was caused by coronary thrombosis.

When a young man he joined the Bell telephone company and was transferred to Kansas, where he was state equipment engineer for 18 years and resident manager at Wellington four years. He purchased the exchange at Moran, Kans., and operated it prior to coming here.

CARLISLE, IND.—Otto L. Finch, 50 years old, owner of the Carlisle Telephone Co. here, recently was injured fatally when his automobile skidded and struck a utility pole. He died in a hospital at Sullivan, Ind., of a fractured skull. He was returning from a business trip to Vincennes.

He lost one hand and suffered a fractured skull in a wreck two years ago. The widow, three sons and a daughter survive.

CHANUTE, KANS.—C. G. Wood, who founded the Manhattan telephone exchange about 50 years ago in partnership with H. P. Wareham, died January 4 in Chanute. He was born in Janesville, Wis., April 30, 1858.

Mr. Wood served as store clerk and bookkeeper in Clay Center, Leavenworth, Lincoln and Lenoardville, before going to Manhattan, Kans. After serving as Riley county clerk and treasurer he became associated with Mr. Wareham in the telephone business, of which he was half-owner.

In 1897 Mr. Wood went to Chanute where he helped build the telephone plant and managed it until 1908. He was city clerk in Chanute from 1915 to 1932.

SAN MARCO, TEXAS—James Gary Roberts, 61 years old, employed by the San Marco Telephone Co., died here of pneumonia on January 13.

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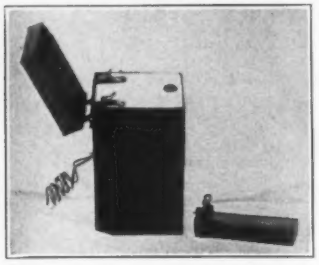

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WANTED TO BUY

WANTED—To lease or buy, preferably lease, telephone exchange of 400 to 1,000 subscribers by two young experienced telephone men. 8607 care TELEPHONY.

POSITIONS WANTED

POSITION WANTED—Thirteen years maintaining magneto, common battery, automatic equipment. Teletype training and experience. Supervision plant maintenance. Will consider job anywhere. Address 8602, care of TELEPHONY.

POSITION DESIRED by telephone engineer with executive experience, aged 38, college graduate, now employed in telephone engineering with 14 years' experience. Address 8564, care of TELEPHONY.

WANTED—Employment in telephone field. Ten years' experience in construction, switchboard maintenance, cable splicing and general trouble shooting. Can furnish reference. Address 8583, care of TELEPHONY.

POSITION WANTED—By switchboard man and wife operator, care of battery charging equipment, etc. Marion Ford, 1332 Meyer St., Augusta, Ga.

POSITION WANTED by 1st class Cableman, 20 years' experience with Bell and Independent; or would accept job as manager of exchange. Address 8580, care of TELEPHONY.

POSITION WANTED—Seven years' Bell traffic experience, university graduate, age 31. Thorough knowledge of modern engineering and operating practices, dial and manual; administrative duties. Address 8511, care of TELEPHONY.

EXPERIENCED line and repair man wants work or will lease a place on monthly payments. Go anywhere; good references. Address 8554, care of TELEPHONY.

JOINT USE OF TELEPHONE POLES

(Concluded from page 8)

rural line feeding from a bank of transformers also supplying service elsewhere, it is possible to get as high as 10,800 volts to ground. It is sometimes possible to get even higher voltages than that.

Therefore, in order to go to the joint use of poles, even using the old method of construction for 7200 volts, I would recommend that an intricate, accurate relay system be used to control the circuit breaker feeding this rural line in such a way that a ground fault would clear about as quickly as it would on a grounded neutral system. Protection would also be required on the telephone circuit. However, all this costs more money, but I think that the longer the line, the less noticeable the cost would be.

At the present time, however, we are working with the telephone companies as much as possible to determine before hand the question as to the magnitude of the longitudinal and magnetic induction from rural lines, even when they are spaced 62 feet apart from the telephone company's line. Even with this spacing the longitudinal induction is with us at all times when the power circuit is charged regardless of load.

▼ ▼

Organization Meeting of New Wisconsin Association

At the organization meeting of The Wisconsin Independent Telephone Association, held at the Loraine Hotel in Madison March 3, Howard Teasdale, of Sparta, was elected president; R. E. Fenske, of Richland Center, vice-president; and W. F. Goodrich, La Crosse, secretary-treasurer. The following directors were elected:

William F. Goetz, manager, Necedah Telephone Co., Necedah; E. B. Mikesell, division manager, Mid-West States Telephone Co. of Wisconsin, Fond du Lac; F. H. Runkel, general manager, Commonwealth Telephone Co., Madison; W. F. Goodrich, La Crosse Telephone Corp., La Crosse; Wayne Newell, president and manager, Farmers Mutual Telephone Co., Baraboo.

R. E. Fenske, proprietor, Home Telephone Co., Richland Center; Howard Teasdale, secretary, Monroe County Telephone Co., Sparta; A. Bowen, secretary, Bangor Telephone Co., Bangor, and H. M. Smith, secretary, Badger State Telephone & Telegraph Co., McNeillsville.

This new association, which is entirely separate from any other telephone organizations in Wisconsin, was formed for Independent telephone men and does not include any Bell interests.